

*Volume 38 Part 8 August 1959*

REVIEW OF APPLIED  
MYCOLOGY



NOTE

Because of a national printing dispute the June and July issues have been delayed, but will appear as soon as possible.

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**4te Jaarverslag Proefstation voor de Groenteteelt in volle grond in Nederland.** [Fourth annual Report of the Experiment Station for outdoor vegetable culture in the Netherlands.] - 95 pp., 12 fig., 1 diag., 1 graph, 1959.

The sections of this report [cf. 36, p. 574] concerned with grafting and varietal research (pp. 37-56) and diseases and pests (pp. 73-86) contain, *inter alia*, the following information contributed by J. BETSEMA, T. BUISHAND, Miss G. BREEBAART, H. J. POERINK, H. A. VAN HOOF, and A. A. FRANKEN. Some 40 per cent. of the progeny of crosses between *Phaseolus vulgaris* and *P. dumosus* when inoculated with *Colletotrichum lindemuthianum* remained healthy and were subsequently inoculated with halo blight [*Pseudomonas medicaginis* f. sp. *phaseolicola*], roll mosaic [bean common mosaic virus str.], 'severe' mosaic [bean yellow mosaic virus str.], and stipple streak [tobacco necrosis virus str.: cf. 37, p. 433]. The 90 plants ultimately retained for seed production did not fulfil all cultural requirements but some were suitable as parents.

Under natural conditions apical necrosis and bean yellow mosaic virus [35, p. 262] were prevalent among crosses of commercial bean vars. interplanted with gladioli. In general, the progenies were resistant to bean mosaic virus but interplanted Double White Stringless was heavily attacked. Resistance to tobacco necrosis virus was also mostly satisfactory in the hybrid populations. In varietal trials, using Double White Stringless as a standard of comparison, Prelude was resistant to virus diseases but susceptible to *Sclerotinia sclerotiorum*, *Botrytis cinerea*, and *C. lindemuthianum*, the last-named also severely infecting Processor. Mechelse Sabel and Ezetha's Superba proved highly susceptible to stipple streak virus, which developed in a virulent form on a number of experimental plots. Westlandia was unduly susceptible to roll mosaic virus.

Resistance to *Peronospora spinaciae* [P. effusa: 37, p. 615] was shown by vars. Proloog, Califlay, and Viking in comparison with the susceptible Viroflay.

The percentages of 'margins' [cf. 35, p. 68] in the white cabbage vars. Roem van Enkhuizen, Vroege Herfstwitte, Late Herfstwitte, and the Success-type group were 37, 78, 83, and 16-78, respectively, corresponding to the results of the 2 preceding years. In preliminary tests on Vroege and Late Herfstwitte wide spacing (67 × 75 and 80 × 90 as against 50 × 60 cm.) and heavy N applications (240 and 320 compared with 160 kg./ha.) increased the incidence of the disorder.

Foot rot of asparagus was found by J. H. van Maris to be caused principally by *Fusarium culmorum* and *F. oxysporum* [35, p. 807]. The former is associated with a hardening and yellow discoloration of the stems, developing from the end of July onwards, while the darkened base is spongy and pink to bright red internally. The latter was isolated from 3 different types of infection, i.e., elliptical, necrotic spots on the fleshy roots, irregular, brown to nearly black areas on the stem base, and die-back of the tops and stems, but inoculations produced only the root spots, so that the exact role of the fungus requires further elucidation.

An unfavourable soil profile, with 2 hard layers at 25 - 37 and 37 - 55 cm. depth, almost impenetrable by the roots, was found to be an important contributory factor in the etiology of the foot rot.

**Annual Report. Department of Agriculture, Kenya, 1957.**  
Vol. 2. - 157 pp., 1959. Sh. 7/50.

The senior plant pathologist [cf. 37, p. 512], R. M. NATTRASS, states (pp. 10-13) that potato blight (*Phytophthora infestans*) [38, p. 294] occurred as early as Feb. for the 1st time on record. One of the most serious and widespread diseases of potatoes, especially in native plantings, was bacterial blight (*Pseudomonas solanacearum*). Cigar-end rot (*Stachylidium* [*Verticillium*] *theobromae*) of bananas was widespread and severe in the Highlands E. of the Rift. Crown rot of strawberries (*Rhizoctonia* [*Corticium*] *solanii*) appeared in widely separated areas, and exceptionally heavy attacks of *Uromyces phaseolorum* [*U. appendiculatus*] occurred

on French beans [*Phaseolus vulgaris*]. *Fusarium graminearum* [*Gibberella zae*] caused an almost total loss of seed from a crop of Rhodes grass [*Chloris gayana*]. A widespread disease of Russian comfrey [*Symphytum* sp.] due to *Pleospora herbarum* was recorded for the 1st time.

New diseases also included *Pseudomonas delphinii* on delphinium, *Mycosphaerella brassicicola* [map 189] on brassicas, *Colletotrichum lagenarium* [map 313] on melon, and *Cryptosphaerella viticola* on vine.

During the year, 74 wheat stem rust [*Puccinia graminis*] collections were received for identification and from 51 tests 5 races, 11, 12, 13, 14, and 16, were reisolated together with 3 suspected new races, the total number identified now being 19. The 3 new races, 17, 18, and 19, were widely distributed throughout the Colony. The most common was 16, which occurred 17 times in the 51 tests; this was followed by 18 (11 times). Screening of the Plant Breeder's selections against races 11, 12, 13, 16, and 17 was resumed; 49 of 125 were resistant to all 5 races.

The work on coffee leaf rust (*Hemileia vastatrix*) by R. W. RAYNER (pp. 36-37) and on coffee berry disease [*Glomerella cingulata*] by F. J. NUTMAN (pp. 50-52) has already been noted [38, pp. 293, 294].

**CASTELLANI (E.).** Plant diseases of economic importance in the Dominican Republic. - *F.A.O. Pl. Prot. Bull.*, 7, 3, pp. 33-36, 1958.

In these notes on diseases of the chief crops recorded during an F. A. O. assignment in the Dominican Republic in 1958 [cf. 7, p. 20] it is stated that *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: map 92] and *Piricularia oryzae* were commonly present on rice in all the areas visited, the latter being of small economic importance. *Cercospora oryzae* was prevalent on the lowland var. Tono Brea; *Entyloma oryzae* [cf. 34, p. 748 et passim] was present in a few places. On maize, *H. turcicum* [map 257] was frequently present, but caused negligible losses.

The Johnson banana, virtually the only one grown for export, formerly considered somewhat resistant to *Fusarium oxysporum* f. *cubense*, is now severely affected by it. Clear symptoms of mosaic virus were observed on B 42337 sugar-cane, but the disease was not found on Co. 290. The sugarcane virus disease that causes most concern is ratoon stunting [map 318]. *Xanthomonas* [*Pseudomonas rubrilineans*] [map 39] is widespread on sugarcane, but of limited economic importance; a few isolated cases of smut (*Ustilago scitaminea*) [map 79] were found.

Symptoms similar to those of mosaic [virus], recently reported from Puerto Rico, were observed on papaw [cf. 36, p. 706]. On vine, *Elsinoe ampelina* [map 234] is widespread and serious. *Puccinia arachidis* [map 160] was noted on groundnuts, *Alternaria solani* [map 89] on potatoes, *Cercospora beticola* [map 96] on beet and *Leveillula taurica* [map 217] on tomato.

**GRAM (E.), BOVIEN (P.), & STAPEL (C.).** Recognition of diseases and pests of farm crops. - [v] + 128 pp., 112 col. pl. (720 fig.), Copenhagen, The Danish Agricultural Information and Advisory Aids Service; Cambridge, W. Heffer & Sons, Ltd., 1958. 35s.

This book illustrates, primarily, the main diseases and pests encountered in Danish agriculture [cf. 31, p. 393] but is of general value to farmers all over N.W. Europe. Each disease is accompanied by a caption in Danish, English, and French. There are indexes in each language and one to Latin names. Translations have all been made elsewhere into Swedish, German, and Dutch.

**HALLSWORTH (E. G.) (Editor).** Nutrition of the legumes. - x + 359 pp., 25 fig., 72 graphs, 2 diag., London, Butterworths Scientific Publications (New York, Academic Press Inc.), 1958. 55s. (\$10.50).

in Agricultural Science) is a symposium of 24 papers by various workers covering the plant component, the rhizobial component, the symbiotic system, biochemical aspects, and field aspects. The 4 papers in the 2nd part deal with the classification of the Rhizobia (H. L. JENSEN), the physiology of nodule formation (P. S. NUTMAN), survival of the root nodule bacteria (J. M. VINCENT), and the legume-Rhizobia symbiosis (P. MANIL). In the last part L. DESSUREAUX (pp. 277-279) discusses the selection of lucerne for tolerance of manganese toxicity and J. PARLE (pp. 280-283) describes field observations of copper deficiency in legumes.

**HOCKENHULL (D. J. D.) (Editor).** Progress in industrial microbiology. - vii + 248 pp., 29 graphs, 15 fig., London, Heywood & Co. Ltd., 1959. 50s.

This is the first of a series of volumes having as its purpose to present, in review form, the advances made under various academic disciplines concerned in fermentation work. It is intended that the early volumes should provide a comprehensive background, of particular value to those new to the field. The reviews in the present volume are: 'The influence of medium constituents on the biosynthesis of penicillin' (116 ref.), D. J. D. HOCKENHULL; 'The morphology and natural relationships of saprophytic actinomycetes' (30 ref.), K. A. BISSET; 'The fermentation of the tetracyclines' (107 ref.), A. DI MARCO & P. PENNELLIA; 'Microbiological assay' (95 ref.), W. T. SOKOLSKI & O. S. CARPENTER; 'Production and biosynthesis of riboflavin in micro-organisms' (235 ref.), T. W. GOODWIN; and 'Microbial fat; micro-organisms as potential fat producers' (332 ref.), M. WOODBINE. There is a subject index.

**FRAZIER (W. C.).** Food microbiology. - ix + 472 pp., 70 fig., 6 diag., 5 graphs, New York, Toronto, London, McGraw-Hill Book Company, Inc., 1958. 70s.

Chapter 1 (pp. 3-26) of this manual deals with moulds and 2 (pp. 27-35) with yeasts, while scattered references of mycological interest occur in the sections on preservation by various methods, spoilage of various classes of foods, enzymes produced by micro-organisms, and food sanitation, control, and inspection, as well as in the appendix on microbiological standards. Each chapter is followed by a bibliography.

**Abstracts of Researches; Tobacco, salt, camphor, 1.** - vi + 97 pp., The Japan Monopoly Corporation, Tokyo, 1958.

These are abstracts of published papers on researches by the Experiment Stations of the Japan Monopoly Corporation, 2 Aoi-cho, Akasaka, Minato-ku, Tokyo, during 1954-56. Titles of papers in reports published during 1945-53 are appended. The information in the section on tobacco diseases (pp. 25-32) has mostly been noticed [cf. 37, p. 374]

**MAZELAITIS (J.) & MINKEVIČIUS (A.).** Valgomieji ir nuodingieji grybai. [Edible and poisonous fungi.] - 247 pp., 28 col. pl., 110 fig., Vilnius, Lithuania S.S.R., State Scientific Publishers, 1957. Roubles 8.50.

This book on some of the larger fungi of Lithuania, U.S.S.R., has a generic key and detailed descriptions of each sp. and their locations. Latin and Lithuanian names are indexed and there is a Lithuanian-Latin key indicating the relative quality of the edible fungi and the degree of toxicity of the poisonous ones.

KLEMENT (Z.) & LOVAS (B.). Isolation and characterization of a bacteriophage for *Corynebacterium flaccumfaciens*. - Phytopathology, 49, 2, pp. 107-112, 8 fig., 3 graphs, 1959.

Further studies of this phage [36, p. 744] at the Hungarian Academy of Sciences, Budapest, are presented. After incubation for 12 hr. on agar plates plaques about 2 mm. diam. are formed. *C. poinsettiae* was also found to be susceptible to the phage. The phage particles are killed in 1 hr. at 65°C.; 79 per cent. of the phage is absorbed in 25 min. Incubation lasts 20 min., lysis 80 - 120; the average burst size was 46. The phage belongs to the sperm-like group, head spherical, 76 $\mu$  diam., tail 240  $\times$  30  $\mu$ . Electron micrographs of lysis show large numbers of spherical bodies of 20  $\mu$  diam., with sometimes flattened, less dense particles of 71  $\mu$ .

MANIGAULT (P.) & STOLL (C.). The role of nucleic acids in crown gall tumor formation. - Experientia, 14, 11, pp. 409-412, 1958.

Using a germ-free 'inducing principle' [cf. 36, p. 178] the authors induced tumour formation in *Datura stramonium* [cf. 38, p. 122]. From their results they conclude that the ability of *Agrobacterium tumefaciens* to induce tumours is due to the nucleic acids and very probably to deoxyribonucleic acid. Possibly a protein fraction of the 'wound juice' is modified by the nucleic acid to become the tumour inducing principle.

YORK (G. T.). Control of the European Corn Borer with the fungus *Beauveria bassiana* and the bacterium *Bacillus thuringiensis*. - Diss. Abstr., 19, 3, pp. 397-398, 1958.

In field trials by Iowa State College at Ankeny, spores of *B. bassiana* [cf. 37, p. 639] obtained from naturally infected corn borers [*Pyrausta nubilalis*] and cultured on commercial feed bran were applied (mixed with corn meal) to maize and caused an av. 88 per cent. reduction in 1st brood larvae in 1955; in parallel trials with attapulgite as carrier the reduction was 78 per cent. The max. reduction of the 2nd brood population was 42 per cent. In 1st brood timing experiments in 1956 the last date of application (29 June) gave the highest mortality (90 per cent.), while satisfactory control of the 2nd brood was not achieved. In the 1st brood timing experiment in 1957 the best results were obtained with applications on 25 June, with nearly equal results for 20 and 30 June: with 3 g. spores/lb. carrier 60-70 per cent. reductions were obtained by applications at 12 and 20 lb./acre. In the 2nd brood timing experiments the 1st and 2nd applications were best, giving reductions in the 50-60 per cent. range, comparable with those obtained with insecticides.

Formulations of 2, 10, and 50 g. of *Bacillus thuringiensis*/lb. corn meal gave 46, 63, and 85 per cent. reductions of the 1st brood, while 2 applications at 20 lb./acre (50 g. of the organism/lb.) gave 77 per cent. control of the 2nd brood.

Richtlinien für die Pflanzenschutz arbeit 1958. [Instructions for plant protection work in 1958.] - Pflanzenarzt, 11, Sondernummer 2, 22 pp., 1958.

This list of approved measures for the control of pests and diseases of cultivated plants is based on the results of experiments at the Bundesanstalt für Pflanzenschutz, Vienna, and on the recommendations of the plant protection conference of 1958. Detailed spray schedules are included in the section on fruit.

Official FDA tolerances listed. - Nat. agric. chem. Ass. News, 17, 3, pp. 3-15, 1959.

A list of the pesticide tolerances laid down by the Food and Drug Administration, U.S.A. up to 1 Mar. 1959, presented in the usual way [cf. 37, p. 518].

**SOMERS (E.).** The preparation of Bordeaux mixture. - J. Sci. Fd Agric., 1959, 1, pp. 68-72, 3 graphs, 1959.

This is a somewhat expanded account of work previously noticed [38, p. 127].

**DARPOUX (H.), CATELOT (Mme), & GORSE (Mlle).** Étude préliminaire sur l'action systemique et endotherapique du sel de manganese de la 2 pyridine thione 1 oxyde. [Preliminary study on the systemic and endotherapeutic action of the manganese salt of 2-pyridinethione 1-oxide.] - Phytatrie-Phytopharm., 7, 4, pp. 107-115, 1958.

At the Station Centrale de Pathologie Végétale, Versailles, this substance [cf. below] was active *in vitro* against a number of bacteria and fungi, 100 µg./ml. sufficing to give complete inhibition of growth of Ustilago zaeae [U. maydis] and Endothia parasitica. Its possibilities as a systemic fungicide were indicated by demonstrating its presence in tissues of tomato, bean, and cucumber, after uptake via the roots. It persisted in the soil for 7 days, and even in some instances for 28 days. Barley plants raised hydroponically were resistant to Erysiphe graminis, under conditions giving heavy infection in controls, when their roots had been exposed for 7 days to 100, 200, or 400 µg./ml. of the fungicide.

**SIJPESTEIJN (A[NTJE] K.) & ROMBOUTS (J. E.).** Investigations on the activity of pyridine-2-thiol-N-oxide as a systemic fungicide. - Meded. LandbHogesch. Gent., 23, 3-4, pp. 824-830, 1958.

Some of this information from the Institute for Organic Chemistry T.N.O., Utrecht, has been noticed [cf. 37, p. 574]. Translocation in cucumber occurs mainly in a downward direction (cf. Sander & Allison, Phytopathology, 46, p. 25, 1956). Emmet peas with a high percentage of internal seed infection by Ascochyta pisi, soaked for 24 hr. in 100 p.p.m. solution, produced mainly or completely healthy seedlings. The presence of the fungicide in the seeds was demonstrated by assay against Glo-merella cingulata spores [cf. 38, p. 124].

**PARRY (K. E.) & WOOD (R. K. S.).** The adaptation of fungi to fungicides: adaptation to captan; adaptation to thiram, ziram, ferbam, nabam and zineb. - Ann. appl. Biol., 47, 1, pp. 1-9; 10-16, 1959.

Continuing their studies at Imperial College of Science, London [cf. 38, p. 181], the authors found that in sucrose-nitrate liquid media Botrytis cinerea was able to grow from spores when captan was present at concs. up to three-quarters saturation. Attempts to produce resistant strains were therefore made with agar media..

Spores failed to germinate when applied as a water suspension to the surface of sucrose-nitrate agar containing 500 p.p.m. captan or when agar extracted with H<sub>2</sub>O and pyridine was used; about 1 per cent. germinated with 250 p.p.m., growth always starting at the edge of the agar. Resistant strains were produced when disks from agar cultures containing low concs. of captan were transferred to agar containing higher concs.; by repeating the process a strain was eventually produced which grew slowly but continuously and sporulated on agar containing 250,000 p.p.m.

captan, though the very low solubility of the fungicide (<1 p.p.m.) affects the interpretation of this figure. Agar disk inocula from resistant strains retained their resistance even after growth on fungicide-free media for 4 bi-weekly periods, but suspensions of spores or hyphae and spores were no more resistant than the parent strain. In drops on glass slides 0.6 p.p.m. prevented spore germination of the parent strain, but about 0.5 per cent. of the spores of the resistant strain germinated in 50 p.p.m., and 1 or 2 out of about 40,000 in 100 p.p.m. This type of resistance, however, was reduced by growth on fungicide-free agar.

Germination of spores from resistant strains taken directly from a culture on a captan medium was only 2 per cent., as against 100 per cent. for the parent spores. Viability rose to 13 per cent. after 1 transfer on a fungicide-free medium, but was only 52 per cent. after 4 transfers.

In the 2nd paper work is described in which the concs. of thiram preventing the germination of *B. cinerea* spores in drops of a 1 per cent. solution of sucrose and on the surface of sucrose-nitrate agar were determined. Thiram had much less effect in solid medium, even when purified agar was used, than in solution. No growth occurred on sucrose-nitrate agar with >31 p.p.m. thiram and strains capable of withstanding higher concs. could not be obtained. Similar results were obtained with ziram, nabam, and zineb.

Ferbam also prevented spore germination more effectively in drops than on agar (ordinary and purified). On sucrose-nitrate agar generally no growth occurred with >125 p.p.m. ferbam but 1 of 48 plates with 250 p.p.m. ferbam gave rise to 5 slow-growing colonies, mycelium from which grew and sporulated rapidly on 500 p.p.m. ferbam agar, and finally a strain was secured which grew slowly but continuously and sporulated on agar containing 5,000 p.p.m. ferbam, though the poor solubility of the fungicide hampered accurate assessment of the degree of adaptation. Some spores from this strain germinated in drops containing about twice the conc. of ferbam which prevented germination of parent spores. The resistance of the mycelium of this strain was not lost after repeated subculture on fungicide-free agar, but the resistant strain was as susceptible as the parent to thiram, ziram, nabam, and zineb.

**SOMERS (E.).** The uptake of a homologous series of fungicides by plant tissue and fungal spores. - Canad.J.Bot., 36, 6, pp. 997-1009, 4 graphs, 1958. [24 ref.]

It is reported from the Canada Dept Agric., London, Ontario, that the mineral oil/water partition coefficients of 2,5-dimercapto-1,3,4 thiadiazole (DMTD) and its n-alkyl thioethers (from methyl to octyl), the uptake of which by potato disks and fungal cells has been studied, increased with the chain length to the amyl homologue, and decreased for the higher homologues, the effect being intensified at low pH when the compounds were almost completely unionized. At equimolar conc. the uptake was not affected by the chain length but was max. with the amyl member. It is postulated that the uptake by potato disks is, at least in part, a cell metabolic process.

Uptake by conidia of *Aspergillus niger*, *Helminthosporium sativum* [*Cochliobolus sativus*], *Monilinia* [*Sclerotinia*] *fructicola* [36, p. 453], and *Stemphylium sarciniforme* increased with the length of the alkyl side chain up to a max. with the amyl homologue and decreased for the hexyl, heptyl, and octyl members. With *S. fructicola* the process was dependent on cell metabolism, but there was no evidence that the compounds were structurally non-specific toxicants and it is suggested that their toxicity is due to chemical interaction in or through a lipophilic biophase of the fungal cell, on the metabolism of which the process depends. It is probable that spores can detoxify an appreciable portion of fungicides either in the cell wall or within the protoplasm.

DE ZEEUW (D. J.), GUYER (G. E.), WELLS (A. L.), & DAVIS (R. A.). The effect of storage of vegetable seeds treated with fungicides and insecticides on germination and field stand. - Plant Dis. Rept., 43, 2, pp. 213-220, 1959.

In further work [cf. 36, p. 369] at Michigan Agricultural Experiment Station, East Lansing, Alderman pea, Round Pod kidney wax bean [Phaseolus vulgaris], and National Pickling cucumber seeds treated in 1956-1958 with 52 fungicide and insecticide materials were sown in the field and germinated in the laboratory. The field stands of the 3 crops for the 3 yr. showed that organic fungicides, alone and in combination with certain insecticides, were superior to the Hg compounds and to insecticides alone, which were injurious to bean stands but had little deleterious effect on the emergence of the pea or cucumber. The phytotoxicity to peas and beans of the volatile type Hg materials increased with length of storage. Laboratory tests did not always predict damage that appeared in the field.

RICHARDSON (L. T.). Effect of insecticides and herbicides applied to soil on the development of plant diseases. II. Early blight and Fusarium wilt of Tomato. - Canad. J. Pl. Sci., 39, 1, pp. 30-38, 3 graphs, 1959.

In further studies at the Canada Dept of Agric., London, Ontario [cf. 37, p. 157], several fungicides and herbicides were applied repeatedly to the soil before leaf inoculation with Alternaria solani and before or after root inoculation with Fusarium oxysporum f. [bulbigenum var.] lycopersici, using young tomato plants grown in sand. Lesion counts indicated an increase in early blight after lindane, 2, 4-D, and isodrin, and a decrease with endrin, maleic hydrazide (MH), N-1-naphthyl phthalamic acid (NPA), dieldrin, prophan, dalapon, demeton, and aldrin. Lindane, isodrin, dalapon, and MH increased the severity of F. wilt, while endrin, aldrin trichloroacetic acid (Na salt), DDT, dinoseb, and 2, 4-D decreased it. The effect of MH and 2, 4-D on wilt development was different in resistant and susceptible plants, according to the time of application, but had no effect on the reaction of immune vars. Dinoseb, which reduced both diseases, was the only substance which acted directly on the pathogen: the others affected resistance by acting on the host.

DOMSCH (K. H.). Die Wirkung von Bodenfungiziden. III. Quantitative Veränderung der Bodenflora. [The action of soil fungicides. III. Quantitative changes in the soil microflora.] - Z. PflKrankh., 66, 1, pp. 17-26, 1959.

In further studies [38, p. 446] over 3 yr. allyl alcohol [36, pp. 663, 805] and methyl arsine bisdimethyl dithiocarbamate + thiram + ziram significantly increased the overall bacterial population of a sedimented compost soil, vapam [see below] decreased it, and nabam, captan, and thiram were without definite effect.

The actinomycete population was increased by vapam and clearly inhibited by captan and the arsenical complex. All 6 fungicides reduced the fungi (relative effectiveness: vapam 100, nabam 93, allyl alcohol 89, arsenical complex 88, captan 78, thiram 65).

DOMSCH (K. H.). Beitrag zur Vapam Wirkung gegen pathogene Bodenpilze. [Contribution to the action of vapam against pathogenic soil fungi.] - NachrBl. dtsch. PflSchDienst (Braunschweig), 10, 10, p. 152, 1958.

The threshold fungitoxic vapam concs. [cf. 37, p. 758 and above] against 25 soil

fungi, determined at the Institut für Getreide-, Ölfrucht-, und Futterpflanzenkrankheiten, Kiel-Kitzeberg, Germany, by placing inoculum (mycelium or sclerotia) at the halfway level in a glass cylinder containing a sterile peat-sand mixture, watering with vapam solution, covering with a larger cylinder, incubating for 24 hr. at 20°C., and then plating samples, ranged from 50-500 p.p.m. A dosage of 50 ml./sq.m., worked in to a depth of 25 cm., corresponding to 200 p.p.m. in these tests, would leave the majority of soil fungi unharmed, whereas 500 p.p.m. or more would be lethal.

**STOBWASSER (H.). Untersuchungen über quantitative Bestimmungsverfahren kleiner Mengen von Pflanzenschutzwirkstoffen nach ihrer Ausbringung besonders in Aerosolform.** [Studies on quantitative procedures for the determination of small quantities of plant protectants after spraying, particularly in aerosol form.] - *Z. PflKrankh.*, 66, 1, pp. 1-15, 1 graph, 1959. [English summary.]

At the Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule, Stuttgart-Hohenheim, Germany, 4 methods were compared for their effectiveness in the analysis of aerosols and their deposits on glass plates. The aerosols were examined by sucking a known volume through a filter and washing out with a suitable solvent. The conc. of the various chemicals (the fungicides used were captan, thiram, Cu salts mixtures in fatty acids, and S) in the aerosols was the lowest found effective in practice. All coloured substances were readily determined colorimetrically, as were colourless ones when a suitable dye (e.g. Sudan red) was added before spraying. Gravimetric determination was possible in most cases, but unspecific and of limited application. Titration of acid substances against NaOH and halogenated organics against  $\text{AgNO}_3$  gave consistent results though sensitivity varied according to the substance in question. In almost every case spectrophotometric comparison of the extinction of the solution with that of a standard solution in the same solvent proved to be a specific and highly sensitive method, the lowest levels determined being from 3-30 mg./sq.m. for sediment and 8-80 mg./cu.m. for aerosol, according to the substance and solvent concerned.

**VIEL (G.), CHANCOGNE (Mlle M.), SY (M.), & BUU-HOÏ (N.P.)**  
**Activité antifongique de dérivés halogénés du biphenyl.**  
 [Antifungal activity of halogenated derivatives of diphenyl.] - *Bull. Soc. Chim. Biol.*, 40, 11, pp. 1617-1622, 1958. [English and German summaries.]

This is a joint report from the Centre National de la Recherche Agronomique, Sèvres, and the Institut du Radium, University of Paris on in vitro and in vivo tests, using Glomerella cingulata and Alternaria oleracea [A. brassicae] in the former series and Plasmopara viticola and Phytophthora infestans in the latter.

Four of the oxyacetic acids were more or less fungicidal to G. cingulata, viz., 3-chloro-4'-ethyl-4-hydroxydiphenyl (compound I), 3-chloro-4-hydroxydiphenyl (II), 3-bromo-4-hydroxydiphenyl (III), and (3-bromo-4-xenyl) (IV), I being less active than zineb while II and III were intermediate between  $\text{CuSO}_4$  and zineb, used as standards of comparison. The conversion of III into IV resulted in a reduction of efficiency. Compounds II and III acted similarly on A. brassicae in comparison with the 2 standards, while (3-chloro-4'-ethyl-4-xenyl) oxyacetic acid (V) and (3-bromo-4'-propyl-4-xenyl) oxyacetic acid (VI) were again less active as a result of conversion.

Against Plasmopara viticola on detached vine leaves, IV, V, and VI were about as efficient as zineb or Bordeaux mixture but V and VI were strongly phytotoxic. On tomato leaves inoculated with Phytophthora infestans II and III were compared with captan, using naphthalene-disulphonate as a spreader with the former and the same

or bentonite with the latter. Compound II caused scorching at a conc. of  $2 \times 10^{-3}$ , while the damage resulting from III + naphthalene-disulphonate was not such as to preclude further experiments in the field. Cucumber plants sprayed with the same 2 compounds and spreaders at 2/mille also sustained more severe injury from II than from III.

**DETROUX (L.). Note sur une étude in vitro des propriétés anti-cryptogamiques de quelques composés organiques de l'étain.** [A note on an in vitro study of the fungicidal properties of some organic compounds of tin.] - Parasitica, 15, 1, pp. 35-36, 1959.

At the Station de Phytopharmaie de l'État, Gembloux, Belgium, it was shown that 9 organic compounds of tin (listed) [cf. 38, pp. 58, 59] exerted a fungicidal action upon Phytophthora infestans, Monilia [Sclerotinia] fructigena, Rhizoctonia [Corticium] solani, Pestalotia sp., and Corticium sp..

**ARK (P. A.) & THOMPSON (J. P.). Control of certain diseases of plants with antibiotics from Garlic (*Allium sativum L.*).** - Plant Dis. Repr., 43, 2, pp. 276-282, 5 fig., 1959.

At the University of California, Berkeley, when 18 fungi and bacteria causing plant diseases were seeded on agar plates containing garlic juice or aqueous extracts of powdered garlic [cf. 38, p. 220] it was observed that each was sensitive to the garlic to various degrees. Downy mildew (Pseudoperonospora cubensis) of cucumber, downy mildew (Peronospora parasitica) of radish, cucumber scab (Cladosporium cucumerinum), rust (Uromyces phaseoli) [U. appendiculatus], anthracnose (Colletotrichum lindemuthianum) and bacterial blight (Pseudomonas [medicaginis f. sp.] phaseolicola) of beans [Phaseolus vulgaris], early blight (Alternaria solani) of tomatoes, brown rust (Monilinia [Sclerotinia] fructicola) of stone fruit, and angular leaf spot (Pseudomonas lachrymans) of cucumber were effectively controlled by sprays of 1-20 per cent. aqueous extracts of garlic and Peronospora parasitica was also controlled by dust formulations of garlic powder in a pyrophyllite carrier (cellite 500 or nuclay). The volatile component of garlic also proved toxic to pathogens. The garlic odour was completely neutralized by water-soluble neutroleum (Fritzche Bros., New York). Garlic powder preserved its antibiotic property for 3 yr. when kept dry at room temp.

**STAKMAN (E. C.). Internationalism in plant pathology.** Tijdschr. PlZiekt, 64, 5-6 (Van Slogteren Nummer), pp. 354-356, 1958.

A general note on the need for international co-operation, with mention of some successes already achieved, viz. the selection of the Institut für Physiologische Botanik, Brunswick, as a centre in Europe for the determination of physiological races of Puccinia glumarum [35, p. 758], the plant quarantine work of Van Slogteren [cf. 35, p. 90], and the achievements of the Centraalbureau voor Schimmelcultures [37, p. 24].

**JONARD (R.). Action des rayons X sur le développement des tissus de crown-gall de Scorzoneră cultivés in vitro.** [Action of X-rays on the development of Scorzoneră crown gall tissues cultures in vitro.] - C.R. Acad. Sci., Paris, 248, 18, pp. 2664-2666, 1 graph, 1959.

At a dosage of 500 r. X-rays reduced the growth of Scorzoneră [hispanica] tissues

infected by crown gall [Agrobacterium tumefaciens: 36, p. 519; 37, p. 72, and below to 26 per cent. of the unirradiated controls, while at 1,000 r. the degree of inhibition reached 69 per cent. The effect was irreversible and could only be temporarily mitigated by an exogenous supply of indole-acetic acid at a conc. of  $5 \cdot 10^{-8}$ .

**KLEMM (M.).** Das Institut fur Pflanzenschutzforschung (VIZR) im der UdSSR. [The Institute for Plant Protection Research (VIZR) in the U.S.S.R.] - NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart, 10, 11, pp. 172-173, 1958.

An account is given of the work and organization of the Institute. A list of Soviet periodicals covering the field of plant protection has been published by the author in NachrBl. dtsch. PflSchDienst, Berl., N.F. 11, pp. 160-162, 1957.

**KLEMM (M.).** Meldedienst, Prognose und Warndienst im Pflanzenschutz. [Reporting service, prognosis, and warning service in plant protection.] - NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart, 11, 1, pp. 1-9, 1 graph, 1959.

A general account of the aims and methods of a warning service for plant pests and diseases.

**FOISTER (C. E.).** Crop improvement and protection sponsored by the State in Scotland. - Trans. bot. Soc. Edinb., 38 (Issue in honour of Prof. Matthews' 70th birthday), pp. 48-55, 1959.

The author briefly surveys some of the technical means by which the State improves and protects crops in Scotland, the word 'State' in practice nowadays generally referring to the Dept of Agriculture for Scotland. The State intervenes on a legislative basis to a certain extent, but secures many useful results in crop improvement and crop protection by means of voluntary schemes and by the provision of research and advisory services.

**SOEMARTONO.** Imunisasi aktif pada tanaman. [Active immunisation in plants.] - Tehn. Pertan., 6, 6, pp. 193-242, 1 fig., 2 graphs, 1957. [38 ref. English summary.]

A bibliographic survey of work on Pseudomonas [Agrobacterium] tumefaciens, fungi, and viruses.

**YARWOOD (C. E.) & SYLVESTER (E. S.).** The half-life concept of longevity of plant pathogens. - Plant Dis. Repr., 43, 2, pp. 125-128, 1959. [31 ref.]

A suggestion from the University of California, Berkeley, is that, since many, if not most, viruses and other plant pathogens are inactivated at a logarithmic rate, the prevalent idea that total longevity can be stated as a definite time is untenable. It is therefore proposed that the half-life, or the time for a population to lose half of its activity, is a more correct method of expressing longevity. Methods of calculation and examples are given.

**GREGORY (P. H.), GUTHRIE (E. J.), & BUNCE (MAUREEN E.).** Experiments on splash dispersal of fungus spores. - J. gen.

Microbiol., 20, 2, pp. 328-354, 2 pl. (10 fig.), 11 graphs, 1 diag., 1959.

At the Dept of Botany, Imperial College of Science, London, splash dispersal was studied by exposing thin films of a suspension of conidia of Fusarium solani on horizontal glass surfaces to water drops falling from known heights. The resulting splash droplets were caught, counted, and measured by the naphthal green B slide method (Liddell & Wootten, Quart. J. R. met. Soc., 83, p. 263, 1957). Both the total number of droplets produced and the number of those carrying spores increased as the film thickness decreased, and as the size and velocity of the incident drop increased. A single drop 5 mm. diam. falling on a 0.1 mm. film produced 5,200 splash droplets (5-2, 400 $\mu$ ), of which over 2,000 carried 1 or more spores. The median diam. was 70 $\mu$  for all droplets, and 140 $\mu$  for those carrying spores, and the medium horizontal distances travelled by these droplets in still air were 10 and 20 cm., respectively, droplets of 164-655 $\mu$  diam. travelling the furthest as a rule; in still air droplets travel beyond 70 cm.

Small spores, such as those of Gloeosporium album, Colletotrichum lindemuthianum, and Nectria cinnabarinina, were even more readily picked up from suspension than the macroconidia of Fusarium solani. Raindrops falling at terminal velocity and drops falling more slowly from vegetation may operate the splash dispersal mechanism. Splash or rain drip from trees may act as a complete dispersal mechanism in still air, or as a 'take-off' mechanism leading to dispersal by wind. Both functions are important in plant epidemiology.

The methods used and the means of calculation are described in considerable detail and the results of a large series of experiments are tabulated. High-speed photography was used to illustrate the course of events when drops fall on a twig bearing conidial fructifications of N. cinnabarinina.

**INGOLD (C. T.) & HADLAND (SUSAN A.).** The ballistics of Sordaria. - New Phytol., 58, 1, pp. 46-57, 4 fig., 4 graphs, 1959.

At Birkbeck College, University of London, spores of S. fimicola discharged from horizontal perithecia [cf. 36, p. 543] were shot to distances of up to 10.5 cm. Spore groups (projectiles) were of all possible sizes (1-8 spores), the mean distances of discharge being proportional to the size. The existence of different sizes of projectile suggests that the spores tend to stick together, but separation may occur at any of the 7 intervals in the row of 8 escaping spores; the tendency to stick together is greater at low than at high temp.

**GUARNIERI (ALICE C.).** Notas sobre o problema do mofo nos livros. [Notes on the problem of mould on books.] - 38 pp., São Paulo, Universidade de São Paulo, 1959. [English and French summaries. 27 ref.]

These notes are the result of experiments at the library of the Instituto de Electricotécnica, University of São Paulo, on mould on books and its control [35, p. 534]. Excessive humidity and high temperature in the Institute library, due to impeded ventilation as the result of the erection of 2 high buildings opposite, probably constitute the main contributory factor. In mild attacks treatment with 96 per cent. alcohol gave good results; in heavier 2/1,000 alcoholic solution of mercuric chloride was effective as was 2/1,000 alcoholic thymol.

**MILES (T. D.) & DELASANTA (A. C.).** Qualitative chromatographic method for identifying mildew inhibitors on military fabrics. - Amer. Dyest. Repr., 48, 7, pp. 31-32, 1959. [10 ref.]

A simple and rapid paper chromatographic method is described from the Quartermaster Research and Engineering Center, Natick, Massachusetts, for the identification of Cu-8-quinolinolate, salicylanilide, 2, 2'methylene-bis-(4-chlorophenol), and

Zn salts of dithiocarbamic acid on materials such as felt and duck.

BREWER (D.). Studies on slime accumulations in pulp and paper mills. I. Some fungi isolated from mills in New Brunswick and Newfoundland. - Canad. J. Bot., 36, 6, pp. 941-946, 5 fig., 1958.

Notes are given on the following fungi isolated at the Atlantic Regional Lab., National Research Council of Canada, Halifax: Phialophora fastigiata, P. richardsiae, P. lignicola, P. alba, Truncatella ramulosa, Trichoderma lignorum [T. viride], Pseudeurotium zonatum, Geotrichum candidum, Rhinocladiella atrovirens, Pachybasium candidum var. trichodermatoides, and P. niveum.

GRIFFIN (D. M.). Hair as a substrate for non-keratinolytic fungi. - Nature, Lond., 183, 4670, p. 1281, 1959.

In studies at the School of Agriculture, University of Sydney, Australia, of the fungal succession in hair decomposing in contact with soil, the hair, whether autoclaved or sterilized with propylene oxide, was found to support limited growth of many non-keratinolytic fungi, including spp. of Mortierella, Cunninghamella, Chaetomium, Aspergillus, Gliocladium, Penicillium, Alternaria, Curvularia, Epicoccum, Helminthosporium, Phoma, and Pyrenophaeta. The ease with which the fungi produced fructifications on this substrate has led to its adoption for teaching work, and it has also proved useful in promoting either asexual reproduction in apparently sterile cultures, or the production of more easily characterised structures in cultures which, on normal media, have produced only an ill-defined mass of simple slime spores.

MULCOCK (A. P.). Discoloration of wool fibres by a fungus. - Nature, Lond., 183, 4670, pp. 1281-1282, 1959.

The author reports from Canterbury Agricultural College, Christchurch, New Zealand, that a Peyronellaea sp. (near P. glomerata), not previously recorded from wool, was the cause of a black discolouration, resistant to normal scouring and common solvents, in a consignment of wool exported to Japan. The fibres were outwardly intact, but large hyphae were obvious within them, and cross sections showed severe mechanical disruption of the cortical cells, which doubtless contributed to the loss of tensile strength. The hyphae within the fibres were moniliiform and dark, anastomosing at irregular intervals. The fruiting structures, within which minute hyaline 1- or 2-celled spores were produced, erupted through the cortical and cuticular cells of the fibres.

Plant quarantine announcements. - F.A.O. Pl. Prot. Bull., 7, 3, pp. 45-46, 1958.

The Hungarian Plant Protection Service has recently published an abstract of Orders Nos. 103/1951-MT, 18055/1951 FM, and 11/1955 FM, outlining the main provisions regulating the importation of plants and plant material.

MOORE (W. C.). The biological basis of the plant import legislation of England and Wales. - Tijdschr. PlZiekt., 64, 5-6, (Van Slogteren Nummer), pp. 357-360, 1958.

A discussion of the principles underlying the British attitude to quarantine regulations, illustrated by examples.

Plant quarantine announcements. - F.A.O. Pl. Prot. Bull., 7, 2, pp. 30-31, 1958.

Details are presented of the Plant Pests and Diseases Act, 1958 (Federation of Rhodesia and Nyasaland), which replaces certain laws previously made under Territorial authorities.

The Importation of Citrus (Restriction) Proclamation of 17 Apr. 1956 (Proclamation No. 6 of 1956) prohibits the importation into Mauritius of citrus plants except under permit. Proclamation No. 11 of 22 Aug. 1958, published in Gov. Gaz. Mauritius, Legal Suppl., 56, 30 Aug. 1958, amends Proclamation No. 1 of 1949 and allows the importation by sea of live plants under permit, not required, however, for fruits, seeds, vegetables, and cut flowers.

The Swedish State Plant Protection Institute has established exemptions from the provisions of current regulations for ware potatoes, which may be imported from 1 Oct. 1958 under phytosanitary certificate, with certain specified declarations.

**BRECH (E. A.). Protection of California agriculture through plant quarantine.** - Bull. Calif. Dep. Agric., 47, 4, pp. 251-269, 13 fig., 1 map, 1958.

An account of the development and maintenance of plant quarantines in California [38, p. 187]. State and federal interior and exterior quarantines (in effect 3 Dec. 1958) against plant pests and diseases are listed.

**STINSON (R. H.), GAGE (R. S.), & MacNAUGHTON (E. B.).**

The effect of light and temperature on the growth and respiration of *Botrytis squamosa*. - Canad. J. Bot., 36, 6, pp. 927-934, 2 graphs, 1958.

Further studies at Ontario Agricultural College, Guelph, have shown that, contrary to previous findings [36, p. 491] which suggested that an illuminance of 70 ft. -c. prevents growth of *B. squamosa*, the fungus when grown at constant temp. is unaffected by light levels of 100 ft. -c. maintained for several days, or by 250 ft. -c. for a few hours. But it is sensitive to temp., max. growth being at 23°C., the lowest temp. used in these studies; there was no growth at or above 30°, thus the earlier reported inhibition resulted probably from high temp. not light.

The colony circumference generally evolved CO<sub>2</sub> more actively than other parts of the mycelial mass, and variations in age and the size of the circumference accounted for much of the variation in CO<sub>2</sub> evolution.

**KOLE (A. P.). Plasmodiophora brassicae en Spongospora subterranea, punten van overeenkomst en verschil. [P. brassicae and S. subterranea, points of resemblance and difference.]** - Tijdschr. Plziekt., 65, 2, pp. 47-55, 1959. [English summary.]

At the Laboratorium voor Phytopathologie, Landbouwhogeschool, Wageningen, symptoms of clubroot (*P. brassicae*) were readily produced by sowing or planting susceptible plants in contaminated acid soil. Powdery scab (*S. subterranea*) is largely unaffected by pH, but, with the exception of the zoosporangial stage, is subject to antagonism by other soil micro-organisms, as was demonstrated in an experiment in which sowing infected seed in steam-sterilized soil resulted in more infection than in non-sterilized. Zoosporangia of both fungi develop readily in contaminated soil, though the soil pH must be suitable for *P. brassicae*. Spores of *S. subterranea* kept in continuously moist soil gradually lost infectivity, which could, however, be restored by air-drying: this treatment had an adverse effect on resting spores of *P. brassicae*. Exposure to -20°C. for 3 days did not

kill the resting spores of either fungus. Those of *S. subterranea* can be stored dry for long periods (over 6 yr.) without loss of vitality, while those of *P. brassicae* are best stored in water at 2-3°, in which they will keep at least 2 yr.

**STAPLES (R. C.) & WEINSTEIN (L. H.). Dark carbon dioxide fixation by uredospores of rust fungi.** - Contr. Boyce Thompson Inst., 20, 1, pp. 71-82, 2 graphs, 1959.

Uredospores of both *Puccinia recondita* from wheat and *Uromyces phaseoli* [*U. appendiculatus*: cf. 38, p. 111] fixed CO<sub>2</sub> in the dark, yielding malic, malonic, and aspartic acids as early products. Evidence is presented to support the hypothesis that oxalacetate is the product of phosphoenolpyruvate carboxylation.

**SRIVASTAVA (D. N.), ECHANDI (E.), & WALKER (J. C.). Pectolytic and cellulolytic enzymes produced by *Rhizopus stolonifer*.** - Phytopathology, 49, 3, pp. 145-148, 3 graphs, 1959.

Studies at the University of Wisconsin, Madison, showed the enzymes of the pectinase complex produced by *R. stolonifer* [2, p. 565] to be polygalacturonase and pectin methyl esterase. Extracts of rotted sweet potatoes showed considerable pectin depolymerase activity, much greater than that of filtrates from cultures on commercial wheat bran or sweet potato broth. Opt. pH for activity of each of the pectolytic enzymes was 4.5. An extract of rotted sweet potatoes was found to contain a small amount of cellulase, sufficient to hydrolyze methyl cellulose.

**ARK (P. A.), DEKKER (J.), & THOMPSON (J. P.). Effectiveness of GS7 a new antibiotic.** - Abs. in Phytopathology, 49, 2, p. 112, 1959.

[At the University of California, Berkeley,] GS7 (Chas. Pfizer & Co.) proved active against plant pathogenic fungi and bacteria in vitro at 0.1 p.p.m., more so against fungus spores at higher pH and mycelium at lower. In vivo tests required higher concs. for control. Germination of uredospores of *Uromyces phaseoli* [*U. appendiculatus*] and sporangia of *Pseudoperonospora cubensis* was inhibited by 0.5 p.p.m., but 100 p.p.m. was needed to control disease caused by these pathogens. *Fusarium solani* f. *cucurbitae* on squash seed and *Ascochyta pisi* on peas were controlled by a 24 hr. soak in 50 and 100 p.p.m., respectively. GS7 is inactivated by ultraviolet light and oxidation, but not by 30 min. autoclaving at 15 lb.

**KIRÁLY (Z.) & FARKAS (G. L.). Biochemical trends in plant pathology.** - Phytopath. Z., 34, 4, pp. 341-364, 1959. [6½ pp. ref. German summary.]

Developments during the last decade are surveyed and the most significant studies briefly indicated. During this period the morphological trend in plant pathology has been increasingly supplemented and even replaced by a physiological-biochemical approach, emphasis now being laid on problems such as the pathophysiology of the susceptible and resistant plant, related biochemical problems, the action mechanism of plant protection chemicals, and chemotherapy. The themes singled out for discussion are the role of metabolites and antimetabolites in the infection process (toxins, growing substances, phenol bodies, etc.), carbohydrate and N metabolism in the diseased plant, and its nucleic acid metabolism (with special reference to virus diseases), biochemical aspects of prevention and chemotherapy, action mechanisms of plant protection chemicals and

drugs, and examples of successful chemotherapy in plant protection.

**MEHTA (P.P.), GOTTLIEB (D.), & POWELL (D.).** Vancomycin, a potential agent for plant disease prevention. - Phytopathology, 49, 4, pp. 177-183, 2 graphs, 1959.

A more detailed account is given of work already noticed [38, p. 186].

Vancomycin is produced by Streptomyces orientalis (McCormick et al., Antibiot. Ann., 1955-56, pp. 606-611, 612-618, 1956). It is primarily bactericidal and bacteria do not appear to develop resistance. Xanthomonas campestris, Pseudomonas phaseolicola, and P. syringae were inhibited by less than 1 $\mu$ g./ml.; Corynebacterium michiganense, X. phaseoli, X. pruni, and X. vesicatoria by 1.5. When seeds were soaked or dipped in vancomycin the antibiotic was detected later in the roots and shoots of the young plant.

**DEKKER (J.) & ARK (P.A.).** Prevention of oxidative destruction of the antifungal antibiotic, pimaricin, by chlorophyll, ascorbic acid, and other compounds. - Abs. in Phytopathology, 49, 2, p. 113, 1959.

Pimaricin [38, p. 63] is inactivated by ultraviolet light, and in darkness by oxidation, and though effective against some seed-borne diseases, is not so on foliage. In water it is inactivated withing 3 hr. on slowly drying bioassay filter paper, but not on rapidly dried paper, or in methanol. Pimaricin absorbed by roots is extractable from leaves with methanol after 2 weeks, and the protective action of chlorophyll which this suggested was proved. Protection was also given by ascorbic acid, hydroquinone, gallic acid, and the quinonimine dyes.

**RESPLANDY (RENÉE) & RESP LANDY (A.).** Élaboration in vitro de substances alcaloïdiques par quelques champignons pathogènes. [Synthesis in vitro of alkaloid substances by some pathogenic fungi.] - C. R. Acad. Sci., Paris, 248, 9, pp. 1400-1402, 1959.

The following spp. were cultured on Lilly and Barnett's semi-synthetic medium [31, p. 137] supplemented by phenylalanine tyrosine, tryptophane, proline, and NH<sub>4</sub>NO<sub>3</sub>: Alternaria tenuis isolated from tomato, Botrytis cinerea from grape pips, Corticium salmonicolor from quinine [Cinchona] branches, Fusarium moniliforme [Gibberella fujikuroi] and Helminthosporium oryzae [Cochliobolus miyabeanus] from rice, Phytophthora palmivora from cacao pods, Sclerotium rolfsii from cassava tubers, and Verticillium dahliae from coffee 'cherries'. The formation of alkaloids in alcoholic extracts of the fungi was revealed by means of chromatograms, using Dragendorff's orange-red stain (Bull. Soc. Chim. biol., 33, p. 486, 1951). They were synthesized from phenylalanine by all the spp. except V. dahliae, from tyrosine by A. tenuis and C. salmonicolor, from tryptophane by A. tenuis, B. cinerea, G. fujikuroi, and P. palmivora, by A. tenuis, G. fujikuroi, and O. miyabeanus from rice, and by none from NH<sub>4</sub>NO<sub>3</sub>.

Further tests were performed with A. tenuis by reason of the frequency and intensity of its reactions. After 30 days of culture the phenylalanine, originally present in the medium had disappeared. A filtrate from the mycelium (which weighed 8.8 g.), after extraction with chloroform and rinsing in distilled water, yielded a solution that reacted strongly to Dragendorff's stain and formed amorphous precipitates on contact with silico-tungstic and picric acids. At a dilution of 1:10 it caused the development on tomato fruits, after 4-8 days, of brownish spots comparable to those resulting from an attack by the fungus itself.

PLOMLEY (N. J. B.). Formation of the colony in the fungus Chaetomium globosum. - Aust. J. biol. Sci., 12, 1, pp. 53-64, 5 graphs, 1959.

A study at the Universities of Tasmania and Sydney of the growth of Chaetomium globosum on agar medium with special reference to hyphal growth, increase in size of the colony, and change in the density of the hyphae within the colony is described.

JEREBOFF (S.). Action opposé du froid et de la lumière sur la croissance des conidiophores de Monilia fructicola. [Opposing action of cold and light on the growth of Sclerotinia fructicola conidiophores.] - C. R. Acad. Sci., Paris, 248, 10, pp. 1576-1579, 1 fig., 1 graph, 1959.

At 50°C. in darkness the growth of conidiophores of S. fructicola [37, p. 454] on a solid synthetic medium plus 5 g. yeast extract and 30 g. glucose/l. was slower and their height increased as compared with those in cultures maintained at 25° [cf. 38, p. 129]. This effect may, however, be totally or partially (50 per cent.) inhibited by even a brief period (1 hr.) of illumination with 250 lux before or during the 2 days following low temp.

QUINTIN-JEREBOFF (SIMONNE). Au sujet d'un nouveau corps antagoniste de l'action inhibitrice de l'auxine. [On a new antagonist to the inhibitory action of auxin.] - C. R. Acad. Sci., Paris, 246, 8, pp. 1260-1263, 1 graph, 1958.

The writer has already shown (C. R. Acad. Sci., Paris, 243, p. 2122, 1956) that Rhizopus nigricans [R. stolonifer], growing side by side with Nectria galligena, can entirely annul the inhibitory action on the latter of indole-acetic acid. This property of R. stolonifer has been attributed to its secretion of biotin [see below], but the results of tests herein reported demonstrate the exercise of a comparable effect of an 'impurity' isolated from the culture medium. It is distinct from citrullin [37, p. 397] and is described as an 'anti-auxin metabolite'.

JEREBOFF-QUINTIN [QUINTIN-JEREBOFF] (SIMONNE). Blocage de la synthèse de quelques acides organiques chez Nectria galligena soumis à des doses inhibitrices d'auxine. Reprise des processus par action de la biotine. [Blockage of the synthesis of some organic acids in N. galligena submitted to inhibitory doses of auxin. Resumption of the processes through the action of biotin.] - C. R. Acad. Sci., Paris, 248, 5, pp. 727-729, 1959.

Biotin at 0.1 mg./l. promoted the resumption of normal growth by N. galligena and its ability to synthesize malic, citric, fumaric, succinic, lactic, and glycolic acids.

JEREBOFF-QUINTIN [QUINTIN-JEREBOFF] (SIMONNE). Sur le rôle de certains acides organiques comme antagonistes de l'action inhibitrice de l'auxine chez Nectria galligena. [On the function of certain organic acids as antagonists of the inhibitory action of auxin on N. galligena.] - C. R. Acad. Sci., Paris, 248, 9, pp. 1389-1392, 1 graph, 1959.

Further experiments have added pyruvic, citric,  $\alpha$ -ketoglutaric, succinic, fumaric, and malic acids to the list of 'anti-auxinic metabolites' already known to counteract the inhibition of growth of N. galligena by indole- $\beta$ acetic acid [see above].

DI MENNA (MARGARET E.). Some physiological characters of yeasts from soils and allied habitats. - J. gen. Microbiol., 20, 1, pp. 13-23, 1959.

This study of yeast populations in soil and on leaf surfaces of pasture plants by the Dept of Scientific and Industrial Research, Wellington, New Zealand [cf. 38, p. 310], showed that most of the spp. could use cellobiose, synthesize growth factors, and use a range of organic acids, and in some cases, including the pigmented spp., aromatic compounds as C sources. Almost all tolerated a wide range of pH and an osmotic pressure of at least 30 atm., but they varied in their ability to survive desiccation. A few spp. could liquefy gelatin and 2 could degrade pectin completely under the conditions used; only 1 could grow under low O tension. No marked or consistent differences could be detected between the 2 habitat groups, which are both able to utilize low concs. of complex food-stuffs, but antagonistic factors arising from other members of the soil and leaf populations may account for the fact that in the field the 2 groups are distinct.

BROWN (JULIET C.). Soil fungi of some British sand dunes in relation to soil type and succession. - J. Ecol., 46, 3, pp. 641-664, 1 diag., 1 map, 1958. [50 ref.]

The recording of the distribution of soil microfungi [37, p. 648] in the successive ecological zones of 8 dune systems [see below] on the British coast (168 spp. are listed) indicated a relatively rich and active fungal population in the dune xerosere, containing few spp. confined to the dune habitat. Acid and alkaline dune mycofloras were distinct from one another; there was a horizontal succession of spp. across the dune systems from the foreshore pioneer to the climax communities of the fixed dunes: accompanying vertical development of fungal population resulted in a stratified microfungal profile.

SEWELL (G. W. F.) & BROWN (JULIET C.). Ecology of *Mucor ramannianus* Möller. - Nature, Lond., 183, 4671, pp. 1344-1345, 1959.

In detailed surveys of the mycofloras of some British dune systems and *Calluna* heathland [cf. 35, p. 548 and above] *M. ramannianus* [cf. 37, p. 77] was found to be one of the commonest fungi in the soils and on roots. It was isolated, by the soil plate method [29, p. 530], from 1 or more of the acid semi-fixed or fixed zones in all dune systems investigated, but never from the alkaline or young acid dunes.

BOOSALIS (M. G.) & SCHAREN (A. L.). Methods for microscopic detection of *Aphanomyces eutiches* and *Rhizoctonia solani* and for isolation of *Rhizoctonia solani* associated with plant debris. - Phytopathology, 49, 4, pp. 192-198, 4 fig., 1959.

At Nebraska Agricultural Experiment Station, Lincoln, 100 g. samples of soil from fields that had been under sugar beet followed by barley, or under peas were suspended in  $2\frac{1}{2}$  l. tap water for  $\frac{1}{2}$  min., when the supernatant liquid was poured through a 60-mesh sieve. The settled soil was resuspended in 1 l. and the process repeated 5-8 times. Large pieces of material on the sieve were picked off, and the soil deposit rinsed through, aided by gentle rubbing. The plant debris particles left were then further macerated more vigorously on a 200-mesh screen and the residues suspended in 35 ml. water; 5 ml. of this suspension were dispersed on water agar in Petri dishes, enabling low power microscopic detection of oospores of *A. eutiches* [38, p. 173] and sclerotia and hyphae of *R. [Corticium] solani* [36, p. 156]. In another method the unrubbed plant residue was dried for 1 hr. on filter paper and samples of the particles were plated on the dry surface of water agar (pH 4.8) to

which drops of streptomycin sulphate (20 mg./ml.) had been pipetted 1 hr. previously, the plates then being incubated for 5 days at 24°C. Although spp. of Fusarium, Trichoderma, and Pythium often appeared first, C. solani, when present grew out of the particles, generally after 48 hr.

Oospores of A. eutiches were found to overwinter embedded in dead plant tissue but could not be germinated in the laboratory. Soil with a high incidence of pea root rot yielded about 9 times as much plant debris so infested as that from an area of moderate incidence. Similarly, 8.5 per cent. of the plant particles from a field where the incidence of beet crown rot had been high yielded C. solani, compared with 2 per cent. where it had been low. All the isolates from the former area were of 1 race, which caused damping-off and seedling blight of beet in greenhouse tests; 63 per cent. of the isolates from the other part of the field were of this same race. When soil from the same field was plated by a standard dilution method plant debris particles were excluded and the presence of C. solani was not evident.

DAS (A. C.) & WESTERN (J. H.). The effect of inorganic manures, moisture and inoculum on the incidence of root disease caused by Rhizoctonia solani Kühn in cultivated soil. - Ann. appl. Biol., 47, 1, pp. 37-48, 1959.

In experiments at Leeds University the growth of R. [Corticium] solani from potato dextrose agar disks in sterilized soil, measured in pyrex growth tubes [33, p. 561] was increased by applications of balanced fertilizer B ( $1\frac{1}{2}$  oz. each hoof and horn and superphosphate, three quarters oz. each  $K_2SO_4$  and lime), moderate doses of K, and by the highest rate of phosphates applied (B + 8P); it was decreased by N and by B + 8K, the effects becoming significant 18 days after inoculation. In unsterilized soil growth was poor with all treatments.

The fresh weights of lettuce seedlings were increased by moderate application of B but decreased by heavier ones, or the single equivalent ingredients. Most disease occurred (in soil inoculated with C. solani cultured on crushed oats) in the B and B + N series, K and phosphate having little effect. B did not give a significant increase in disease until the B  $\times$  4 level was reached; with unbalanced fertilizers, B + 4N and B + 8N increased disease significantly, but K and P did not.

In soils with different moisture contents inoculated with C. solani most disease in lettuce occurred at the lowest moisture levels (40 per cent. saturation). At this point growth of the host was restricted, while fungal spread was greatest.

The fungus in the tubes required a min. supply of nutrient (food base) to establish itself in soil, but removal of the PDA inoculum disks after 5 days did not affect the rate of growth. In a series of mixtures of inoculated soil with standard soil from 1:0 to 1:32 high concs. of inoculum reduced pathogenicity [cf. 37, p. 397]; max. disease development was at 1:16. The survival of C. solani in inoculated soils was not greatly affected by soil fertility.

The persistence and rate of spread of a soil parasite was demonstrated by burying a thin strip of a culture of C. praticola [37, p. 522], strongly pathogenic to lettuce, 1 cm. inside a rectangular container parallel to rows of germinated lettuce seedlings 2 cm. apart. Affected seedlings were found after 4 days, when all seedlings were removed and replaced by a fresh lot. There was a decline in mortality in successive sowings in the row over the inoculum, but the disease spread to 12 cm. after 20 days; in acid soils spread was slower.

The effects in sterilized soil of the various factors examined are largely overshadowed in unsterilized soils by other factors, such as competition from other micro-organisms. This encourages the formation of sclerotia. In general it appears that although fertilizer levels influence the growth of the pathogen and the host as well as the development of the disease, the degree of imbalance usually found in unsatisfactory glasshouse soils is not in itself likely to be a main cause of root disease.

KOCKOVÁ-KRATOCHVÍLOVÁ (ANNA) & PALKOSKA (V.). A taxonomic study of the genus *Rhizopus* Ehrenberg 1820. - Preslia, 30, 2, pp. 150-164, 1958.

At the Slovak Technical University, Bratislava, and the Institute of Vitamin and Hormone Chemistry, Prague, 77 identified strains of *Rhizopus* from various parts of Europe and Asia, representing all the named spp. except one, and others isolated in Czechoslovakia from soil and parasitic sources were found to fall into the 5 spp., *R. circinans*, *R. oryzae*, *R. nigricans* [*R. stolonifer*], *R. arrhizus*, and *R. oligosporus*. Among the characters used to separate them were the co-efficient of correlation between the length and width of sporangiophores, between the length and width of sporangia, and between length of sporangia and spores.

LINDQUIST (J. C.). Las royas parasitas de *Baccharis*. [Rusts parasitic on *Baccharis*.] - Rev. Fac. Agron. La Plata, 34, 1a, pp. 1-79, 50 fig., 1958. [English summary.]

A study of 53 *Puccinia* spp. parasitic on *Baccharis*, of which 9 are new.

ORELLANA (R. G.). Variation in *Phytophthora palmivora* isolated from Cacao and Rubber. - Phytopathology, 49, 4, pp. 210-213, 3 fig., 1 graph, 1959.

Studies in Costa Rica and Ceylon showed that isolates of *P. palmivora* from cacao and rubber differed in culture on various media; the cacao isolates formed less appressed colonies, growth rate was higher, sensitivity to malachite green [37, p. 144] less, sporulation more profuse, and sporangia larger. No oospores were produced on potato dextrose agar by pairing the 2 strains in Costa Rica, nor in Ceylon, using cacao isolates from Ceylon, Costa Rica, and Ghana and rubber isolates from Costa Rica or Ceylon or an isolate of *P. heveae* from Malaya. Although symptoms were produced on rubber seedlings and fruits by isolates from cacao they were much less severe than those caused by the rubber isolates, which caused no symptoms on cacao. Compared on cacao pods, the cacao isolate from Costa Rica was the most virulent and that from Ceylon the least.

In view of these results transfer to varietal status is proposed, *P. palmivora* [(Butl.) Butl. var. *theobromae* (Colem.) Orell. [cf. 37, p. 220] for the strain attacking cacao and *P. palmivora* var. *heveae* (Thomp.) Orell. for that on rubber.

HUGHES (S. J.). Revisiones *Hyphomycetum* aliquot cum appendice de nominibus rejiciendis. - Canad. J. Bot., 36, 6, pp. 727-836, 5 fig., 1958.

This list was compiled at the Botany and Plant Pathology Division, Canada Dept Agric., Ottawa, after checking some 400 generic and 1,000 species names from the original publications. It illustrates the adoption of Persoon, *Synopsis methodica fungorum*, 1801 as the starting point for the nomenclature of *Hyphomycetes* as proposed by the author in Taxon, 8, 3, pp. 96-103, 1959.

JØRSTAD (I.). Uredinales from southern South America, the Falkland Islands and Juan Fernandez, chiefly collected by Carl Skottsberg.

JØRSTAD (I.). Uredinales from South America and tropical North America chiefly collected by Swedish botanists. II. - Ark. Bot., Ser. 2, 4, 4, pp. 45-58; 4, 5, pp. 59-103, 1959.

The 1st paper, based on 51 specimens, includes 6 new spp. The 2nd [cf. 36, p. 130]

deals with 99 spp. identified from 201 specimens. The rust genera and spp. are grouped under host families. Puccinia menthae [map 211] was found on Bystropogon hirsutus in Ecuador, on B. mollis in Ecuador and Bolivia, and on B. spicatus in Bolivia and Peru.

DONK (M. A.). Notes on resupinate Hymenomycetes. V. - Fungus, Wageningen, 28, 1-4, pp. 16-36, 1958.

A key is given to the genera which have been included in Botryobasidium [35, p. 792] and Ceratobasidium; their salient features are discussed. A new genus is proposed, Koleroga (based on the Kole-roga fungus (Pellicularia koleroga), which is proposed as a new sp., K. noxia Donk, as Pellicularia is illegitimate.

NOBLES (MILDRED K.). Cultural characters as a guide to the taxonomy and phylogeny of the Polyporaceae. - Canad. J. Bot., 36, 6, pp. 883-926, 1958. [69 ref.]

Two major groups were delimited within Polyporaceae after a study of cultures of 252 spp., a primitive group producing no extracellular oxidase and, if heterothallic, showing the bipolar type of interfertility, and a more advanced group producing extracellular oxidase with the tetrapolar type of interfertility in those spp. with regularly nodose-septate or simple-septate hyphae or bipolar interfertility in those with simple-septate hyphae in the advancing zone, and nodose-septate elsewhere. Groups of spp. within those 2 groups may represent taxa of generic or higher rank. An annotated key segregates these spp. groups in order of the increasing complexity of hyphal components; their evaluation as entities in the classification of Polyporaceae requires a correlated study of cultures and sporophores; here the spp. constituting each group, with relevant synonymy, are listed.

RAMAKRISHNAN (T. S.). Notes on some fungi from South India. - Proc. Indian Acad. Sci., Sect. B, 49, 2, pp. 124-128, 2 fig., 1959.

Of the 5 spp. described, Pythium vexans [29, p. 532] is recorded as the agent of a canker of young rubber trees in Kerala, the 1st record for this host in India, though Sharples reported the disease in Malaya [16, p. 60]. Pellicularia filamentosa [Corticium solani] on living leaves and twigs of Lagerstroemia indica in the same province constitutes another new host record.

SLANKIS (V.). An apparatus for surface sterilization of root tips. - Canad. J. Bot., 36, 6, pp. 837-842, 2 fig., 1958.

The apparatus, designed at the Canada Dept Agric., Ottawa, is made by the Emerald Glass Co., 544 Rogers Road, Toronto. It consists of a column of 4 sterilization compartments, each containing a sterilization dish made of a glass ring, 9.4 mm. diam., with a piece of capillary tubing covered with nylon as a base. A rod attached to the ring and passing sideways out of the chamber through a cork enables the plane of the dish to be changed for introduction of the root tips (cleaned as recommended by Melin [16, p. 49]), which is effected through a transfer inlet in each chamber. The sterilizing fluid and sterile water, contained in flasks attached by rubber tubing, are dripped through the column. Full details are given of the construction of the apparatus (usable in the field if necessary), its manipulation, and methods of cleaning it with suitable fluids after use.

THUNG (T. H.) & DIJKSTRA (J.). Binding van virusremstoffen

aan kleimineralen. [Adsorption of virus-inhibiting substances by clay minerals.] - Tijdschr. Plziekt., 64, 5-6 (Van Slogteren Nummer), pp. 411-418, 1958. [English summary.]

At the Laboratorium voor Virologie, Wageningen, the inhibitory effect of carnation sap [cf. 37, p. 724] on tobacco necrosis virus, propagated in Phaseolus vulgaris, was nullified when montmorillonite or H-illite (illite treated with HCl to give a uniform surface layer of H<sup>+</sup> ions) were added to the inoculum-sap mixture before inoculation of tobacco. A similar effect operated even when the clay was applied to tobacco and bean leaves inoculated some minutes beforehand. The action of these clay minerals in increasing the infectivity of the inoculum even in the absence of carnation sap suggests that there is also an inhibitor in bean sap. There is evidently a possibility of using clay minerals to purify virus preparations.

**YARWOOD (C. E.). Virus increase in seedling roots. - Phytopathology, 49, 4, pp. 220-223, 1959.**

In experiments at the Virus Research Unit, Cambridge, England, in which roots and hypocotyls of seedlings in Petri dishes were inoculated by abrasion with celite, 6 of the 15 viruses tested were shown to multiply in bean (Phaseolus vulgaris) and some of these also in pea, maize, cowpea, and pine. As root infection is not generally visible, macerated tissue was assayed on local-lesion hosts. Tobacco necrosis virus (TNV) in Prince bean increased more rapidly than most other viruses, the conc. doubling about every 4 hr. some 2 days after inoculation. Addition of phosphate [31, p. 474] was without apparent effect. Inoculations in the proximal region of the rootlet-producing zone gave positive results and on the last (tip) cm. of the root were successful in 1 of 6 seedlings, but on the hypocotyl and cotyledons were generally unsuccessful. TNV did not normally move from roots to stems [cf. 16, p. 418] and movement could be stopped by a node. Virus was generally recoverable from the tissues through which successful inoculation was obtained, but tissue resistant to inoculation was also resistant to invasion of virus from other parts. Immersion in water before inoculation appeared less inhibitory to infection of the roots by TNV than to infection of bean leaves by tobacco mosaic virus [cf. 37, p. 341]. TNV was able to increase in pine roots (Pinus sylvestris) by 5 days after inoculation, reaching a max. in about 10 days, and disappearing from roots in soil in 14 or more days.

Sugar beet latent virus [31, p. 157] increased in seedling roots of bean, pea, maize, and cowpea with or without prior injury and was recoverable from the diffusates of infected, turgid, uninjured roots. It was eliminated by surface sterilization of roots with HgCl<sub>2</sub> and disappeared in the roots of inoculated plants grown in soil.

**HEINZE (K.). Neue Überträger für das EnationenVirus der Erbse (pea enation mosaic) und einige andere Virosen. [New vectors of Pea enation mosaic virus and some other viruses.] - Phytopath. Z., 35, 1, pp. 103-104, 1959.**

In further studies [cf. 36, p. 750] at the Institut für Gärtnерische Virusforschung, Berlin-Dahlem, the author succeeded in transmitting pea enation mosaic virus with the aphid Cerosiphia gossypii after 1 day's feeding on infected broad bean plants to 2 of 10 clover plants (Trifolium incarnatum). The result was not nearly so successful as with Acyrthosiphon onobrychidis, which infected up to 100 per cent. of the plants.

Of the non-persistent viruses, cucumber mosaic was transmitted by Dactynotus henrichi after a short feeding time on the source plant from cucumber to tobacco (2 of 10 plants) and by Macrosiphon daphnidis from tobacco to cucumber (1 of 10). Turnip mosaic virus was transmitted after short feeding time from turnip to turnip by Cerosiphia helianthemi (9 of 10 plants), M. daphnidis (7 of 10), and Macrosiphoniella tanacetaria (2 of 10).

BADAMI (R.S.). Some effects of changing temperature and of virus inhibitors on infection by Cucumber mosaic virus. - Ann. appl. Biol., 47, 1, pp. 78-89, 1959.

In experiments at Rothamsted Experimental Station to determine how infections by cucumber mosaic virus are affected by environmental changes and by substances inhibiting viruses known to be ribose nucleoproteins, it was shown that whereas the spinach strain of cucumber mosaic virus [cf. 38, p. 290] failed to multiply and to cause symptoms in tobacco plants kept at over 30°C., the yellow strain caused infection even at 36°, at which temp. it induced more severe symptoms than at 20°. Increases in temp. up to 28° increased the initial rate of multiplication of the spinach strain, but later the virus reached much higher concs. in leaves at lower temps., probably because it rapidly becomes inactivated at 28°. Exposure of inoculated plants to 36° for 6 hr. reduced the number of infections by the spinach strain only if exposure began within 6 hr. of inoculation.

Pancreatic ribonuclease inhibited infections by both the yellow and the spinach strains of cucumber mosaic virus. Inhibition was greatest when the enzyme was present in the inoculum; when it was applied to inoculated leaves, the effect rapidly declined with increasing time after inoculation.

Infection by and the multiplication of strains of cucumber mosaic virus in tobacco were only slightly affected by thiouracil, though greatly so by azaguanine; strains of tobacco mosaic virus, on the other hand, were inhibited to a much greater extent by thiouracil than by azaguanine. Cucumber mosaic virus, like tobacco mosaic virus, multiplied more when inoculated leaves were floated in nutrient solutions than when they were floated in water, but the multiplication of cucumber mosaic virus, unlike that of tobacco mosaic virus, was not inhibited by thiouracil more in nutrient solutions than in water.

LEVIN (Ö.). Chromatography of Tobacco mosaic virus and potato virus X. - Arch. Biochem., 78, 1, pp. 33-45, 2 fig., 6 graphs, 1958.

At the University of Uppsala, Sweden, ion exchange chromatography of tobacco mosaic virus, with stepwise elution of the virus from the DEAE-cellulose anion exchanger, yielded 4 fractions [cf. 37, p. 311]. All, on inoculation into tobacco, produced the normal green mottling symptoms, but whereas with the 1st fraction 20 of 25 plants also exhibited dark green spotting, only 5 of 25 did so after inoculation with fraction 4, and the symptom was less marked in such plants. With unfractionated virus 10 of 25 plants developed the symptom. There were physical differences between the virus progenies from the plants inoculated with the different fractions [cf. 36, p. 134]. Similar results were obtained with potato virus X.

MARAMOROSCH (K.). Studies of Aster yellows virus transmission by the leafhopper species *Macrosteles fascifrons* Stal and *M. laevis* Ribaut. - Proc. 10th Int. Congr. Ent., 3 (1956), pp. 221-227, 1958.

The specificity of aster yellows virus transmission [35, p. 579 and below] was tested with the leafhopper spp. *M. fascifrons* from U.S.A. and *M. laevis* from Europe at the Rockefeller Institute, New York. Colonies of virus-free insects were reared on rye and wheat plants. In 5 consecutive tests a total of 200 American and 200 European leafhoppers from stock were inoculated by feeding for 2 weeks on plants with either the Eastern or the California str. of yellows. Afterwards the insects were tested for 2 or more weeks, in groups of 3-5/plant, on young China aster plants. None of 80 plants exposed to *M. laevis* became infected, while *M. fascifrons* transmitted the Eastern str. of virus to 38 of 40, and the California str. to 23 of 40 plants. The tests indicate that the degree of specificity in the transmission of aster yellows

virus is relatively high and the earlier belief that introduction to Europe of plants with American aster yellows would result in the spread of the disease by M. laevis seems unwarranted.

The Eastern and California strains have been found to interfere in plants and in M. fascifrons, but no similar data are available for other yellows type viruses. In the absence of such experiments and of serological tests for this group it cannot be established whether different strains or distinct viruses are responsible for yellows syndromes in other areas of the world. The ability of several spp. of leafhoppers to transmit yellows does not contradict or invalidate the concept of specificity. The search for vectors of typical yellows type viruses can probably be limited to the Cicadellidae at present, but the standard criteria for the identification of the latter seem inadequate.

**MARAMOROSCH (K.).** Beneficial effect of virus-diseased plants on non-vector insects. - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 383-391, 1958. [Dutch summary.]

At the Rockefeller Institute, New York, adults and nymphs of Dalbulus maidis [38, p. 202], normally unable to survive on healthy aster plants, survived on plants infected by aster yellows virus almost as well as on maize. The same individuals could furthermore survive on healthy aster plants after a conditioning period on the infected ones. Although the leafhoppers retained the virus, they could not transmit it to healthy asters [cf. 32, p. 607]. No progeny were produced on aster. The possible importance of this phenomenon is discussed [cf. 31, p. 98].

**ZOGG (H.).** Studien über die biologische Bodenentseuchung. II: Beeinflussung der Pathogenität von Ophiobolus graminis Sacc. durch die Mikrofloren verschiedener Böden mit verschiedenen Fruchtfolgen. [Studies on biological soil disinfection. II. The influence exerted on the pathogenicity of O. graminis by the microflora of different soils with different crop rotations.] - Phytopath. Z., 34, 4, pp. 432-444, 1 graph, 1959. [English summary.]

At the Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon, Switzerland, reduction of infection by O. graminis [37, p. 347; 38, p. 194] was studied on young wheat plants at different periods (immediately, 3, and 10 weeks) by mixing cultures of the parasite with soil samples from 15 sites with varied types of crop rotation. No differences were revealed in relation to locality, soil characteristics, humus content, or pH. In spring 1956 a clover-grass mixture was undersown in cereal crops, which likewise had no influence on O. graminis. In subsequent years soil samples were taken in spring and the influence on pathogenicity (soil disinfecting effect) determined (by the disease index method) for each soil sample for the same 3 periods. In 1957, with soils from crop rotations heavily overloaded with susceptible cereals, a high degree of infection occurred immediately on the admixture of the parasite cultures; at 3 and 10 weeks the pathogenicity curve showed a relatively slow decline. Where there was no overloading with susceptible cereals initial infection was high, rather high, or moderate when a cereal crop was grown in 1956, 1955, or 1954, respectively, the decline at 3 and 10 weeks being rapid in all 3 years. In 1958 there were no differences in O. graminis infection.

**KIRÁLY (Z.).** On the role of phenoloxidase activity in the hypersensitive reaction of Wheat varieties infected with stem rust. - Phytopath. Z., 35, 1, pp. 23-26, 1959. [German summary.]

Studies at the Research Institute for Plant Protection, Budapest, Hungary [cf. 37, p. 451], showed that, using gallic acid as a substrate, phenoloxidase activity

occurred in healthy resistant wheats (Triticum timopheevi, Einkorn, and Khapli) but not in healthy susceptible (R. 23). An increasing activity was demonstrated in infected leaves of both types, but in susceptible only after the disease (Puccinia graminis var. tritici) had fully developed, and not in the same degree as in the former, which indicates that the hypersensitive reaction of rust resistant wheats is associated with the activity of the polyphenol-phenoloxidase system.

**WARMBRUNN (K.). Prüfung des deutschen Weizensortiments auf Widerstandsfähigkeit gegen Zwergrsteinbrand (Tilletia controversa Kühn).** [Testing of German official Wheat varieties for resistance to dwarf bunt (T. controversa).] - Angew. Bot., 33, 1, pp. 1-9, 1959.

From the Pflanzenschutzamt Stuttgart it is reported that all the German official wheat vars. were tested in 1954-57 at Schwäb. Alb for resistance to T. controversa [37, p. 344; 38, p. 77], spores of which were evenly scattered on the soil at 1 g./3 sq. m. No fully resistant var. was found. Graf Toerring II, Erbachshofer Braun, HS Burgweizen, and Wahrberger Ruf are quoted as relatively resistant, followed by Heges Früher and Karat.

**ZOOG (H.). Beitrag zur Kenntniß der Lebensdauer von Zwergrsteinbrandsporen im Boden (Tilletia controversa Kühn).** [On the viability of dwarf bunt spores (T. controversa) in the soil.] - Phytopath. Z., 35, 1, pp. 1-22, 3 fig., 4 graphs, 1959. [19 ref. English summary.]

At the Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon, Switzerland, spores of T. controversa were placed on 10 cm. squares of closely woven nylon cloth laid flat in (1) furrows 5, 15, or 25 cm. deep carefully covered with soil, (2) pots in the greenhouse, or (3) Petri dishes in the refrigerator. Periodically (up to 38 months) squares were removed and spore germination tested at 3-5°C. under continuous artificial light on the surface of soil in Petri dishes. In comparison with spores stored dry in the laboratory the germination of those in the soil was accelerated by 5-16 days. After several months in the soil there was a remarkable decrease in germination, though even after 38 months some still occurred. Spores placed in the soil in autumn did not germinate in the following March or Apr., except a few individuals. When the spores were mixed with seed disinfectants no germination occurred. To test the efficacy of stored seed disinfectants, dried pulverized layers of dwarf bunt spores mixed with them were mixed also with fresh spores of T. tritici [T. caries] and the germination tested on soil in Petri dishes at 9-12°C. A Hg disinfectant had completely lost its activity, whereas that containing hexachlorobenzene + Cu (probably because of its Cu content) prevented fresh spores from germinating. Spores without added fungicide show a rapid morphological degeneration after 6 months' storage in soil, while treated ones were very well preserved in shape. Thus the probability of infection from within the soil is only small. Infested straw as carrier of the disease seems to be of greater importance. In the most infested regions of Switzerland [cf. 36, p. 16] the highest infection rates occur in the neighbourhood of threshing places, along forest borders, hedges, avenues, and generally in wind exposed places.

**PETIT (A.). Remarques préliminaires sur la détection du charbon interne du blé (Ustilago tritici (Pers.) Jens.).** [Preliminary notes on the detection of internal smut of Wheat (U. nuda).] - Ann. Serv. bot. Tunis, 28 (1955), pp. 55-65, 1958.

During the determination of the presence of U. nuda [cf. 37, p. 637] in over 50,000 wheat seeds in Tunisia in 1955-6, the author noted that the wheat germ showed different degrees of infection. Analysis based on the presence or absence of internal

mycelium gave too high an estimate of the effective infection, as the percentage of smutted stools is almost always appreciably below that of seeds observed microscopically to be infected.

To ascertain whether any relationship exists between the density of the mycelium in the germ [cf. 38, p. 253], its distribution, and the actual level of effective infection in any year, the degrees of seed infection were arranged arbitrarily in 7 categories, in descending order of supposed virulence: tt, t, TF, F, M, f, and ff. In category tt, 2 mycelial bundles are present (or one very large one), and these are approaching or have reached the growing point; t denotes the presence of 1 visible bundle, which appears early, while the scutellum contains only a few filaments, or later on; the remaining categories refer to seeds in which no mycelial bundles are present, but only a diffuse, ramified or localized mycelium.

This classification was first used on 11,000 seeds, of which 711 (6.46 per cent.  $\pm 0.4$ ) were smutted (total of 2 series, A and B, each of 14 specimens). The method was then used on smaller numbers and on groups with different degrees of total infection.

The 2 series A + B gave 34,547 stools, of which 1,437 (4.15 per cent.  $\pm 0.2$ ) were affected. The ratio of affected stools: seeds was 64.24 per cent. The best formula (of a number tried) for calculating the number of seeds with active mycelium was found to be  $\frac{t}{2} + TF + F$ .

In 1955-6,  $\frac{2}{2}$ 1 per cent. of smutted ears gave about 2 per cent. smutted seeds. Tillering of smutted stools is lower than that of healthy ones. Of 34,547 stools, 1,437 (4.15 per cent.) were smutted. Of 102,707 ears, 3,289 were smutted; the ratio affected seed: ear = 2.03 (or 0.49 inversely); the ratio affected stool: smutted ear = 0.78 (or 1.27 inversely); the extent of general tillering = 2.97 [shoots], tillering by healthy stools = 2.98, and tillering by smutted stools = 2.64, with 2.28 smutted and 0.36 healthy ears.

**LAL (S.B.) & SILL (W.H.). Combination reactions of three small-grain viruses on Wheat.** - Phytopathology, 49, 4, pp. 214-220, 2 fig., 1959.

A more detailed account of information already noticed [37, p. 711].

**GLYNNE (MARY D.). Effect of potash on powdery mildew in Wheat.** - Plant Path., 8, 1, pp. 15-16, 1959.

At Rothamsted Experimental Station in July 1958 the incidence of powdery mildew (*Erysiphe graminis*) [cf. 36, p. 579] on wheat in plots carrying the 1st and 3rd crops after a 1-yr. fallow, all of which had received the same amount of N with different combinations of mineral fertilizers, and in a dunged plot, showed that the disease was consistently most severe in plots given N and P ( $N_2$ , P;  $N_2$ , P, 3 NA; and  $N_2$ ,  $P_2$ ,  $2\frac{1}{2}$  Mg); Na and Mg had no apparent effect. The disease was moderately severe where N was applied without phosphate ( $N_2$ ); it was relatively slight with K as well as N and phosphate ( $N_2$ , P, K; and  $N_2$ , P, K, Na, Mg), Na and Mg again having no effect, and it was least severe on the plot given 14 tons/acre of dung (equivalent to about  $2N_2$ , P,  $2\frac{1}{2}K$ ).

**LUIG (N.H.), McWHIRTER (K.S.), & BAKER (E.P.). Mode of inheritance of resistance to powdery mildew in Barley and evidence for an allelic series conditioning reaction.** - Proc. Linn. Soc. N.S.W., 83 (1958), 3 (388), pp. 340-362, 1959. [31 ref.]

At the University of Sydney a further 5 vars. were found to be highly resistant to the Australian races 3 and 18 of *Erysiphe graminis hordei* [see below], viz. Triple Bearded Lemma, Triple Awned Lemma, Cheroff, Monte Cristo, and Unnamed B. 174;

all carried the Algerian ( $Ml_a$ ) gene. In the resistant var. No. 22 another gene,  $Ml_a$ <sub>2</sub>, apparently at the Algerian locus, conditioned resistance. Gopal and Purple Nudum were found to possess a gene ( $Ml_a$ <sub>4</sub>) at the Algerian locus (or closely linked to it). Thus the present studies suggest that a series of at least 5 alleles at 1 locus may condition reaction.

The findings in relation to Goldfoil, Chevron, Moore H. 76, and Hanna suggested that each possesses a single factor for mildew resistance, independent of  $Ml_a$ ; the latter was linked with the single incompletely dominant gene in Psaknon. Linkage was also indicated between one incompletely dominant gene in Portuguese and  $Ml_a$ <sub>3</sub> in var. No. 22. Inheritance of resistance in Duplex was explained by the action of 1 dominant and an independent recessive, both independent of  $Ml_a$ . There was no indication of linkage of either  $Ml_a$  or  $Ml_p$  with 7 and 1 morphological factor pairs, respectively, involving linkage groups I, II, III, IV, and V; nor was  $Ml_a$  found to be linked with genes for resistance to *Puccinia hordei* and *P. graminis secalis*.

**MOSEMAN (J. G.) & SCHALLER (C. W.).** The effect on various cultures of *Erysiphe graminis* f. sp. *hordei* of the genes in Barley that condition resistance to culture CR3. - *Phytopathology* 49, 4, pp. 207-209, 1959.

At Beltsville, Maryland, and the University of California, Davis, a study of the  $F_3$  families from crosses of 7 vars. of barley, each with a single distinct gene conditioning resistance to culture CR3 of race 3 of *E. graminis* [38, p. 319 and above], showed that those genes were also responsible for resistance to other races of *E. graminis* as follows:  $Ml_a$ <sub>2</sub> in Black Russian,  $Ml_a$ <sub>3</sub> in Ricardo, and  $Ml_p$  in Psaknon to culture A8 of race 6, 28A1 of Race 8, A9 of race 9, R11 of race 11, and CAN12 of race 12;  $Ml_g$  in Goldfoil to A8, 28A1, and A9;  $Ml_a$ <sub>7</sub> in Durani to 28A1, A9, R11, and CAN12;  $Ml_h$  in Hanna to A8; and  $Ml_k$  in Kwan to 28A1 and A9.

**CALDWELL (R. M.), SCHAFFER (J. F.), LEROY (E. C.), & PATTERSON (F. L.).** Tolerance to cereal leaf rusts. - *Science*, 128, 3326, pp. 714-715, 1958. [*Biol. Abstr.*, 33, 5, p. 1581, 1959.]

Two pairs of oat vars., Benton and Bentland and Clinton 59 and Clintland [cf. 38, p. 255] were tested under severe crown rust (*Puccinia coronata*) conditions at Purdue University, Lafayette, Indiana. Each pair is essentially "isogenic" except that 1 member of each pair is resistant and the other susceptible. Losses in yield and quality for Benton (susceptible, tolerant) were nil or small in comparison with Bentland, but with Clinton (susceptible, non-tolerant) the loss was comparatively severe. The theoretical advantage in oat breeding of tolerance over resistance depending on hypersensitivity is discussed in relation to development of new physiologic races of *P. coronata*.

**LEWIS (R. W.).** Production, storage, and germination of conidia of *Claviceps purpurea*. - *Acta bot. hung.*, 5, 1-2, pp. 71-77, 1959.

At Michigan State University, East Lansing, conidia of *C. purpurea* were produced in shake cultures at 28°C. in tens of millions/mil. in a few days in a potato-extract-sucrose medium. They were successfully stored for months in a refrigerator at 5 or -20°, 500 g. of commercial sucrose being added to the developed culture to give a 60 per cent. solution. Germination was increased [cf. 38, p. 250] when 0.1 per cent.  $KH_2PO_4$  solution was used instead of water. DDT (used against ergot beetles) at about 0.25 per cent. did not affect germination of the conidia on slides.

**ZWILLENBERG (HELGA H. L.).** *Colletotrichum graminicola* (Ces.) Wils. auf Mais und verschiedenen anderen Pflanzen.

[*C. graminicola* on Maize and various other plants.] - Phytopath. Z., 34, 4, pp. 417-425, 7 fig., 1959. [English summary.]

In inoculation tests on plants in the open or in the greenhouse at 26°C. at the Phytopathological Laboratory 'Willie Commelin Scholten', Baarn, Netherlands, with a conidial suspension of an isolate of *C. graminicola* from maize [37, p. 160], healthy maize leaves were rapidly and completely pervaded. Aervuli developed after 2-10 days. The fungus was much less pathogenic to rye. No macroscopic lesions developed on leaves of wheat, barley, oats, *Lolium perenne*, *Dactylis glomerata*, or *Vicia villosa*. Microscopic examination of *L. perenne*, *D. glomerata*, and wheat revealed a thickening of the outer epidermal cell walls at the sites of the appressoria. No mycelial penetration of the epidermal cells or the presence of latent mycelium was observed. Appressoria, however, remain viable for 3-4 weeks at least. The fungus was only capable of penetrating moribund leaf tissue, where it continues its life cycle. *V. villosa* responds to infection by a noticeable thickening of the outer epidermal cell wall, with strikingly large swellings cuneiform in shape. However, the fungus failed to penetrate the cells, even when the leaf tissue did. Superficial appressoria remained viable for some time.

**QUE BRA L (F. C.). Anthracnose of Corn.** - Philipp. Agric., 42, 6, pp. 250-263, 3 fig., 1958.

Of 7 commercial vars. of maize tested none proved resistant to *Colletotrichum graminicola* [cf. 29, p. 609], though Catamay's Cuban and I 20 Sib survived. The following grasses all proved susceptible in cross-inoculation tests: *Cynodon dactylon*, *Panicum maximum*, *Echinochloa stagnina*, *Digitaria sanguinalis*, *Tripsacum laxum*, *Melinis minutiflora*, *P. pururascens*, and *Pennisetum setosum*.

**Outbreaks and new records.** - F.A.O. Pl. Prot. Bull., 7, 3, pp. 43-44, 1958.

I. HARPAZ, Hebrew University, and G. MINZ and F. NITZANI, Agricultural Research Station, Rehovot, report that a dwarf disease affected maize in Israel during the late spring and early summer, 1958. A few newly affected plants were also observed in the later stages of growth in summer and autumn. Maize in all parts of the country was affected, but chiefly in the central part of the coastal plain, 3-60 per cent. of plants during the peak period of infection in June, the figure varying with the area, the season, and the variety.

The symptoms appear to be identical with those of 'nanismo ruvido' (rough dwarf) in Italy [37, p. 651], the only difference being that in Israel the swellings of the veins on the lower surface of the affected leaves are less pronounced than those described by Biraghi as 'veinal hyperplasia' [32, p. 249]. It is assumed that the disease is due to a virus.

**VENKATA RAM (C.S.). Production of growth-promoting substances by *Fusaria* and their action on root elongation in *Oryza sativa* L.** - Proc. Indian Acad. Sci., Sect. B, 49, 3, pp. 167-182, 1959.

At the University Botany Laboratory, Madras, India, the stimulation by *Fusarium* culture filtrates of the growth of the roots of 3-day rice seedlings [cf. 36, p. 204] was found to be attributable to 3 amino acids, viz. cystine, phenylalanine, and tyrosine.

**MOUTON (J.) & MERNY (G.). La riziculture en pays Bété et le faux-charbon du Riz.** [Rice-growing in Beteland and false smut of

Rice.] - Riz. & Rizic., 5, 1, pp. 30-36, 3 graphs, 1 map, 1959. [English and Spanish summaries. 20 ref.]

The chief rice diseases in Beteland, Ivory Coast, are Helminthosporium oryzae [Cochliobolus miyabeanus: cf. 37, p. 351] and Ustilaginoidea virens [cf. 28, p. 355; 37, p. 351], of which the former is the more common and the latter the more spectacular. Observations showed that the incidence of infection by U. virens is always greater in the lowlands than at higher altitudes, and there appears to be a linear relation between the rates of infection in the 2 regions. No correlation was established between the severity of infection and the annual rainfall as registered during Apr. - Aug., but the number of rain days seemed to be of greater importance. Certain microclimatic factors (damp or sheltered situations) favour the disease, and vars. with hairy glumes are more susceptible than glabrous ones. The paper concludes with notes on control by the selection of panicles to be used for seed.

**CHANT (S.R.). Investigations on a seedling die-back of *Theobroma cacao* L. in Nigeria. I. Description of the disease and its spread in the nursery.**

**CHANT (S.R.) & HALL (T.H.R.). II. Factors affecting the incidence of the disease and its control.** - Trop. Agriculture, Trin., 36, 2, pp. 138-144, 4 fig.; pp. 145-149, 1959.

Earlier accounts of the disease, caused by a Phytophthora sp. near palmivora [37, pp. 203, 220], are supplemented by details concerning symptoms and spread.

Normally the 1st sign of the disease, about 4 weeks after sowing, is a brown discoloration at the tip of one of the leaves of a young seedling. This is followed by a blackening and wilting of the petiole and later the upper part of the stem, the necrosis spreading down the stem as far as the cotyledons. The seedlings are very susceptible up to 6 weeks; very few become infected after 8 weeks.

If necrosis does not progress as far as the cotyledons the seedlings may recover by the development of the axillary buds. Sporangia of Phytophthora sp. appear on the petiole and the upper part of the stem 5-6 days after infection. From observations on the spread of the disease in 4 isolated plots it seemed that primarily infection occurs at random, but later is related to the loci of the 1st infected seedlings. Difficulties in obtaining the causal agent in pure culture were overcome by inoculating cacao pods and egg-plant fruits with portions of infected stems.

The 2nd paper describes 2 fully randomized factorial experiments in Sept. 1955, one under the light shade of oil palm fronds and the other under heavy shade, in which a relationship was demonstrated between heavy shade and high R.H. and the incidence of seedling die-back. A similar relationship holds for black pod (P. palmivora) [35, p. 515] infection. Incidence was higher in heavy soil than in sandy soil, perhaps because of waterlogging in the former, which would tend to retard growth and increase susceptibility.

**RANGASWAMI (G.), RAO (R.R.), & LAKSHMANAN (A.R.). Studies on the control of Citrus canker with streptomycin.** - Phytopathology, 49, 4, pp. 224-226, 1 graph, 1959.

At Annamalai University, Annamalainagar, Madras, control of Xanthomonas citri [36, p. 684; 37, p. 478] was obtained on limes sprayed at 15 day intervals with streptomycin sulphate (740 units/mg.) at 500 and 1,000 p.p.m., but not with lower concs. Addition of 1 per cent. glycerin resulted in better absorption of streptomycin, which was shown to be present in the leaf sap of 3-yr.-old plants within 12 hr. of spraying and up to 21 days later. The antibiotic was not, however, detected in water shoots that developed after spraying, and these needed separate treatment. Some transient phytotoxicity in the form of chlorotic spots on the leaves was apparent. The effective concs. appeared to kill the bacterium in the canker spots.

on the leaves, from which it could not subsequently be isolated.

NAGPAL (R. L.). Presence of tristeza and other virus diseases of Citrus in Bombay State, India. - F.A.O. Pl. Prot. Bull., 7, 3, pp. 37-38, 2 fig., 1958.

Inoculation experiments at the College of Agriculture, Poona, since 1954, have indicated that tristeza virus [map 289] is widespread in Bombay State on citrus, especially sweet and mandarin oranges. Apparently healthy trees, it seems, also carry the virus. Pitting was present on sweet lime stocks budded with Mosambi sweet orange, and asymmetrical fruit was also seen, apparently indicating the presence of xyloporosis [virus: 14, p. 162]. Symptoms characteristic of strains A and B of citrus psorosis virus [cf. 37, p. 476], with gum formation, were also found on citrus trees in many places in Bombay State.

NOPITSCH (M.), MÖBUS (E.), & HAVENITH (D.). Die Gelbfleckenkrankheit der Baumwolle. [The yellow spot disease of Cotton.] - Melliand Textilber., 39, 11, pp. 1268-1271, 9 fig., 1958. [English, French, and Spanish summaries.]

'Cavitoma' and BGY(bright greenish-yellow) spotting [35, p. 607] are stated to be 2 of the most common diseases affecting both growing cotton plants and the quality of the harvested and stored fibres. Studies at the Forschungsinstitut Hohenstein (in collaboration with J. P. Elbing, Research Laboratory, Paw Creek, N. Carolina, and W. F. Harris, Cotton Economic Research, University of Texas, Austin) showed BGY spots to be caused primarily by Aspergillus flavus, accompanied by Fusarium sp. (pink), Macrosporium nitens (grey-black), A. niger, Cladosporium herbarum (brown-black), Alternaria sp. (brown), and Botrytis sp. (green)., whereas those of 'cavittoma' yielded A. niger, A. clavatus, Trichoderma viride, M. nitens, Heterosporium echinulatum [Didymella dianthi] (black), C. herbarum, and Alternaria sp. Cellulolytic bacteria associated with both defects comprise largely aerobic, Gram- organisms.

From the known high moisture demands of fungi and, more particularly, bacteria, it is reasonable to assume that cotton dried to and stored at R. H. 65 - 70 per cent. is protected from further microbial degradation. Reactivation of some of the organisms may occur, however, in damp storage or shipment of bales.

HOFFMANN (G. M.) & FRITZSCHE (R.). Erdflohfrass und Infektion des Leins durch Polyspora lini Laff. [Flea-beetle damage and the infection of Flax by P. lini.] - Phytopath. Z., 34, 4, pp. 398-410, 4 fig., 1 graph, 1959. [English summary.]

Infection experiments at the Institut für Phytopathologie, Aschersleben, Germany, showed that P. lini is a wound parasite. Under field conditions injuries are caused by the feeding of Longitarsus parvulus and Aphthona euphorbiae. Seedlings sprayed with a suspension of P. lini conidia 24 hr. after beetles had fed on them were severely attacked (100 per cent. of Löber Blau, and somewhat less of Fasertreu and Bernburger Stamm 112) and typical leaf spot symptoms developed. Liability to infection after beetle feeding persists for over 7 days. The sap which exudes from the wounds stimulates the germination of the spores. In distilled and tap water, unlike Colletotrichum lini [C. linicola], P. lini either fails to germinate or does so unsatisfactorily. Rapid germination occurs, however, in flax plant extracts and in biomalt solution (3 per cent.). On the margins of uninjured flax leaves, the germination rate remained low but was considerably increased in the marginal area of wounded leaf tissue, germination declining proportionately to the distance from the wound.

KERR (H. B.). *Melampsora lini* (Pers.) Lév. uredospore longevity and germination. - Proc. Linn. Soc. N.S.W., 83 (1958), 3 (388), pp. 259-287, 3 fig., 16 graphs, 1959.

During genetical investigations of resistance to *M. lini* of different flax and linseed vars. at Sydney University, 1948-53, it was found that a boiled aqueous extract of host tissue greatly stimulated the germination of uredospores stored in a refrigerator at 0 - 20°C. for 1 week to 18 months [cf. 37, p. 663], whereas germination on water was highly capricious. It was better on gelatin but still somewhat capricious, while 100 per cent. germination was obtained on host extract. Preliminary experiments showed that the substance responsible was part of or comprised the ether-soluble oily fraction adsorbed by activated charcoal. A significant difference was found between races when temp. and especially humidity were carefully controlled. Low temp. and intermediate R.H. were most favourable to the maintenance of uredospore viability during storage.

TEMPEL (A.). Over de serologische verschillen tussen *Polyspora lini* en *Pullularia pullulans*. [On the serological differences between *P. lini* and *P. pullulans*.] - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 482-484, 1 pl., 1958. [English summary.]

At the Laboratorium voor Bloembollenonderzoek, Lisse, Netherlands, 1 isolate of *Polyspora lini* from flax, and 2 of *Pullularia pullulans* from flax and forsythia were found to be serologically related, but to differ in 1 factor [cf. 24, p. 506].

HOFFMANN (G. M.). Untersuchungen über die Anthraknose des Hanfes (*Cannabis sativa* L.). [Studies on anthracnose of Hemp (*C. sativa*).] - Phytopath. Z., 35, 1, pp. 31-57, 16 fig., 5 graphs, 1959. [English summary.]

Further studies [cf. 37, p. 723] at the Institut für Phytopathologie, Aschersleben, Germany, showed that the size of the conidia of the strain of *Colletotrichum atramentarium* from hemp was greater than that of the potato strain which also formed larger single sclerotia. As there were clear differences in culture on different nutrient media, the 2 strains are considered to be distinct races.

*C. atramentarium* germinates most successfully at 25°C. and at a pH of 5-6 in the medium. No germination occurs above 35°. Opt. temp. for growth is 25°. At 7° and under only very little development is possible. Infection was not possible on young plants in the field and succeeded only at high air humidity when the plants were approaching maturity.

On tomato plants both strains caused a leaf spot disease. The potato isolate caused streak-like necroses on the stem, whereas the hemp isolate induced a marked weakening of the stem, causing it to break. Inoculation of wounded and unwounded tomato fruits resulted in symptoms similar to those previously ascribed to *C. phomoides* [27, p. 392]. This supports the assumption that this sp. is *C. atramentarium*.

The pathogen of hemp anthracnose is not transmitted by seed and overwinters on plant remains in or on the soil. The sclerotia formed in the autumn developed into richly sporulating acervuli in the spring. Infection and colonization of the host occur mainly after flowering. The disease is known so far only on bog soils. The possibility that predisposition to the disease can be caused by edaphic factors is indicated.

SLOOTWEG (A. F. G.). Enkele ziekteproblemen bij bloembollen [Some disease problems of flower bulbs.] - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 445-451, 1958. [English summary.]

A summary of disease control measures in the Dutch bulb industry.

**VAN SLOGTEREN (D. H. M.). Rattelvirus als oorzaak van Ziekten in bloembolgewassen en de mogelijkheden de infectie door middel van grondontsmetting te bestrijden. [Rattle virus as a cause of diseases in flower bulbs, and the possibilities of controlling infection by soil disinfectants.] - *Tijdschr. PlZiekt.*, 64, 5-6 (Van Slogteren Nummer), pp. 452-462, 4 pl., 1958. [English summary].**

Symptoms of rattle virus infection [potato stem mottle virus: 36, p. 281] on pink and red vars. of tulip (e.g. Zenith, Imperator) include red stripes on the perianth, the deep red vars. (Red Emperor, Brilliant Star) develop almost black stripes, while stripes on white vars. are glassy and transparent. Stripes or diamond-shaped markings on the leaves are transparent by transmitted light and yellowish green by reflected light; affected plants may be stunted. Leaf symptoms on hyacinth are similar, but there are in addition necrotic flecks inside the bulb. Symptoms on *Scilla campanulata* and *Ornithogalum thyrsoides* agree closely with those on hyacinth. In *Allium moli* and *Eremurus* sp. yellow, diamond-shaped markings occur on the leaves, in *Narcissus* yellow spots at the leaf bases and on the stem, and in crocus yellow diamond shapes, rings, or arcs on the leaves. The disease may be confined to patches in a tulip field in which many plants are stunted and show primary symptoms (generally restricted to the leaf bases). A significant proportion of healthy tulip bulbs planted in such patches becomes infected in the following year, the rate of infection being related to the depth of planting (36.2, 46.1, and 95.1 per cent. at 5, 10, and 22 cm., respectively).

Inoculation of White Burley tobacco with sap from affected plants gave typical rattle symptoms. The reactions of field isolates of the virus with rabbit specific antiserum were irregular, indicating the existence of strains. Rod-shaped particles similar to those already described [28, p. 87] were seen in preparations from infected tulip, hyacinth, and crocus.

Spraying the soil of an infected tulip field with formaldehyde immediately before planting considerably reduced infection (e.g. 8.2 per cent. compared with 61 per cent. in untreated beds), but injections of formaldehyde into the soil 7 weeks before planting proved useless; it is concluded that infectivity is soon restored and that the bulbs are susceptible only for a limited period, coinciding with root formation. Chlorobromopropene injected at 1.25 l./14 sq. m. 7 weeks before planting was fairly effective. In view of the failure of inoculations in tulip it is assumed that there must be some vector as yet unknown, and for the same reason it is unlikely that all the alternative host plants will be revealed by sap inoculation. The presence of the virus in the field was demonstrated by inoculating tobacco with sap from roots of *Capsella bursa-pastoris*, *Senecio vulgaris*, and *Stellaria media* [cf. 36, p. 281].

**SCHENCK (P. K.). De infectiecyclus van *Urocystis gladiolicola* op Gladiolen. [The infection cycle of *U. gladiolicola* in Gladiolus.] - *Tijdschr. PlZiekt.*, 64, 5-6 (Van Slogteren Nummer), pp. 475-478, 1958. [English summary].**

From studies at the Laboratorium voor Bloembollenonderzoek, Lisse, Netherlands, of the progeny of Van Tienhoven plants infected by *U. gladiolicola* [cf. 32, p. 483] the following conclusions are drawn: infection is possible from spores adhering to the scales of corms and cormels; growth is not markedly influenced by the disease in the season of infection; sori are often visible in the scales during the last weeks of the growing season; mycelium may be present in corms exhibiting no sori; and diseased plants arise from corms carrying mycelium at the time of planting, the infection having occurred in the previous year.

In preliminary experiments hot water treatment and disinfection before planting offered promise.

VLAG (A. F.) & HULKENBERG (A. M.). Proeven ter Bestrijding van vuur in Tulpen. [Experiments on the control of fire in Tulips.] - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 440-444, 1958. [English summary.]

At the Proefstation voor de Bloembollenkultuur, Lisse, Netherlands, cultural measures such as crop rotation, removal of any bulbs that failed to grow, early cutting of flowers, and heat treatment of the bulbs reduced infection by Botrytis tulipae [cf. 38, p. 118], but complete control was achieved only by fungicidal treatments. In crops sprayed with ferbam, zineb, and thiram bulb yields were increased by at least 7,000 kg./ha., and treatment of the growing plants combined with mercurial disinfection of the bulbs gave greatly increased yields, especially in new fields.

KAMERBEEK (G. A.). Het blauw groeien van Tulpebollen. [Blueing of the Tulip bulb.] - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 463-469, 2 graphs, 1958. [English summary.]

From experiments at the Laboratorium voor Bloembollenonderzoek, Lisse, Netherlands, it appears that blueing, i.e., the development of necrotic spots in the underlying scales, visible through the outer living scale, is a physiological phenomenon. Factors which diminish growth also reduce the incidence of the disorder.

JENKINS (J. E. E.). Methods for the detection of vascular wilt pathogens in Carnation cuttings. - Plant Path., 8, 1, pp. 23-27, 1959.

From the National Agricultural Advisory Service, Cheshunt, the preferred method is described for detecting the presence of Verticillium cinerescens, Fusarium oxysporum f. dianthi, Pseudomonas caryophylli, and the slow wilt strain of Erwinia chrysanthemi [cf. 36, p. 31] in carnation cuttings [cf. 35, p. 767]. Selected cuttings are 2 internodes longer than normal. About 5-10 are placed in 20 per cent. chlorox (or 20 per cent. proprietary 'chloros') + wetting agent so that the 2 lower internodes are covered for 5 min. The cuttings are then placed between 2 sheets of absorbent paper, each cutting being removed in turn to a smaller piece. Transverse sections are cut with a sterile blade, 2 from each internode, together with 1 through the intervening node, and transferred to a tube containing disco nutrient broth + 1.5 per cent. dextrose, which is labelled and placed in an incubator at 24°C. The cuttings are put in separate polythene bags and stored at 0-4.5°. After 10 days the tubes are examined, and where microbial growth is noted the corresponding cutting is rejected. The remaining cuttings are grown under controlled conditions as nuclear stock plants. During the last 2 yr. about 6,000 cuttings from 3 nurseries in the Lea Valley have been tested.

BURNETT (H. C.). Orchid diseases of Florida. - Bull. Fla Pl. Bd., 2, 12, 36 pp., 6 col. pl., 6 fig., 1958. [34 ref.]

The following diseases are briefly described in semi-popular terms, with directions for their control: black rot of leaf and heart rot (Phytophthora cactorum) [cf. 29, p. 467]; black rot (Pythium ultimum) [25, p. 502; 32, p. 432]; several spp. of rust (Uredo behnickiana, U. guacae, and U. nigropunctata); anthracnose (Glomerella

cincta and the doubtfully distinguishable G. cincta, together with 4 Physalospora spp. [35, p. 679]; petal blight (Sclerotinia fuckeliana); leaf spots due to Cercospora epipactidis, C. peristeriae, Septoria selenophomoides [loc. cit.], and Diplodia laeliocattleyae; fly speck (Leptothyrium sp.); root rot (Rhizoctonia [Corticium] solani), which generally attacks seedlings in community pots, but has been known to infect older plants; brown spot (Phytonomas [Pseudomonas] cattleyae) and soft rot (Erwinia carotovora) [22, p. 207]; and 2 virus diseases, Cattleya flower break and cymbidium mosaic [37, p. 484]. There is also a description of the following diseases not found in Florida: rust (Hemileia oncidii), European anthracnose (Gloeosporium affine), vanilla rootrot (Fusarium batatas) [7, p. 669], and leaf spots caused by Cercospora odontoglossi, C. cypripedii, C. angraeci, and Mycosphaerella cattleyae [35, p. 679].

**DOWNIE (D[OROTHY] G.).** Rhizoctonia solani and Orchid seed. - Trans. bot. Soc. Edinb., 37 (1957-8), 4, pp. 279-285, 1959.

At the University of Aberdeen it was found that the seed of 6 orchids reacted favourably with 1 or more of 9 strains of R. [Corticium] solani (3 from Orchis purpurella [see below] and 6 from non-orchid hosts), the remaining orchids being either parasitized or uninhabited. The normal symbionts of 2 of the stimulated orchids, Coeloglossum viride and Goodyera repens, are similar, having a creamy-white mycelium 4-5 $\mu$  diam. with encrusted sclerotial areas. They thus differ in colour and hyphal dimensions from most strains of Corticium solani. It was therefore surprising that both orchids were stimulated by a fungus so different from their normal symbiont. The growth induced by C. solani is much less and the association more unbalanced than with their respective endophytes.

**DOWNIE (DOROTHY G.).** The mycorrhiza of Orchis purpurella. - Trans. bot. Soc. Edinb., 38 (Issue in honour of Prof. Matthews 70th birthday), pp. 16-29, 3 pl., 1959.

From further studies [see above] the author concludes that O. purpurella is non-specific with regard to its associated symbiotic fungus. Proof is submitted that Corticium solani is a frequent endophyte in its roots and is an accepted symbiont at seed germination. It is thought that the distribution of C. solani as a widespread soil saprophyte and facultative parasite 'reflects on' the soil ecology of other orchid endophytes.

**GHAFOOR (A.).** A preliminary note on Phytophthora wilt of Snapdragon in Pakistan. - F.A.O. Pl. Prot. Bull., 7, 2, pp. 27-28, 1 fig., 1958.

During Dec. and Jan. antirrhinums, flowering or about to flower, at Karachi were affected by a root disease causing wilting followed by sudden death. The stem became blackened and rough at the base, and dry, sunken, dark lesions appeared on it near the ground; the discolouration spread towards the roots, which decayed. A Phytophthora sp. [cf. 30, p. 630; 34, p. 649] isolated was shown to be strongly pathogenic, killing seedlings in about 2 weeks.

**NÜESCH (B.).** Eigenschaften von Zuchttämmen aus einheimischem Italienisch-Raigras. [Characteristics of breeding strains of indigenous Italian Ryegrass.] - Mitt. schweiz. Landw., 7, 2, pp. 17-23, 3 fig., 1959.

Seven Swiss selections of Italian ryegrass [Lolium multiflorum] tested for

agronomic characters at the Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon, were highly susceptible to Puccinia coronata [32, p. 193].

McGLOHON (N.E.). Survey of fungi associated with White Clover stolons. - Plant Dis. Repr., 43, 1, pp. 22-24, 1 graph, 1959.

A survey by the S. Carolina Agricultural Experiment Station, Clemson in the summer of 1958 showed that spp. of Fusarium, Colletotrichum, Rhizoctonia, Macrophomina, Curvularia, and Trichoderma were present on white clover stolons at practically every location sampled in the State. At Clemson F. spp. were associated with about 70 per cent. of the stolons and R. spp. with 17 per cent. There was a negative correlation between the population of Trichoderma and that of Rhizoctonia.

FORD (R.E.). Stem and leaf blight of Birdsfoot Trefoil caused by Fusarium roseum. - Abs. in Phytopathology, 49, 4, p. 227, 1959.

Leaf and stem blight of Lotus corniculatus in New York fields - bleaching and crooping of stem tips followed by death of the shoot - was shown to be caused by F. roseum [cf. 56, p. 683]. Opt. temp. for disease development at 100 per cent. R.H. was approx. 82°F. Fragmented cultures proved better inoculum than spore suspensions and infection was obtainable without wounding. Roots of seedlings of L. corniculatus 1-3 weeks old were not susceptible but severe root rot developed in L. arenarium, L. divaricatus, and L. maroccanus transplanted into infested sterilized soil.

NIENHAUS (F.). Über die chemische Bekämpfung von Phytophthora cactorum, dem Erreger der Kragenfäule an Apfelbäumen. [On the chemical control of P. cactorum, the agent of collar rot of Apple trees.] - Phytopath. Z., 34, 4, pp. 365-384, 3 fig., 2 graphs, 1959. [English summary.]

At the Institut für Pflanzenkrankheiten, University of Bonn, new methods were elaborated for determining resistance of fungicides to rain and estimating spore germination in P. cactorum [37, p. 665]. Logs (8-yr.-old Cox's Orange apple; 7 × 40 cm.) with comparatively smooth bark, split down the middle, and parquet floor blocks (oak) with identical surface areas were used. Both showed the same resistance to rain so that in subsequent tests blocks were mainly used. The logs and blocks were coated over a defined area with the preparation under test and after drying for 24-48 hr. were exposed to a fine spray of distilled water atomized by compressed air through a fine nozzle maintained at a constant distance from the block or log. The run-off water was collected and centrifuged for 30 min. at 6,000 rev. min., dried in a balance at 100°C., and weighed. The water solubility of the preparation was predetermined and a standard wt. was added together with the change of wt. brought about by drying at 100°.

The fungistatic effect of the run-off water and the residual fungicide remaining on wood and bark were subjected to spore germination tests with P. cactorum and Alternaria tenuis. The fungicides were tested by Zobrist's method as described by Blumer & Kundert [31, p. 565] and that of Biedermann and Müller [31, p. 342].

Several Cu oxychloride compounds proved ineffective in prophylactic treatment of P. cactorum on apple trees, because after light rain the fungistatic effect of the water running off the stem was not sufficient to protect wounds or fissures in the bark from infection.

One Hg and 1 organic Cu preparation were effective because of their rain

resistance and protracted fungistatic activity. They can be recommended for prophylaxis on an experimental basis. Chemical sterilization of the soil and chemotherapeutic treatment of diseased trees gave negative results. Two isolates of P. cactorum from orchards treated with Cu for several years were more tolerant of Cu than an isolate from untreated trees. Within a single isolation populations could be separated into 3 groups differing in Cu sensitivity. By passage through Cu solutions (0.004-0.012 per cent. Ob 21) 1 isolate was made Cu tolerant, apparently by selection of the more resistant members of the population.

**TEN HOUTEN (J. G.). Resistance trials against collar rot of Apples caused by Phytophthora cactorum. - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 422-431, 2 pl., 3 graphs, 1958. [Dutch summary.]**

Following preliminary work at the Instituut voor Plantenziektenkundig Onderzoek, Wageningen, it was concluded that a cork borer method [Buddenhagen, 35, p. 103; cf. 38, p. 213] was best suited for inoculation, which should be done in June. As a rule the rootstocks did not influence the susceptibility of the scions, though scions of seedling stocks appeared more susceptible than those on East Malling IV and EM VI. In tests of 80 apple vars. and 8 EM rootstocks James Grieve, Wealthy, Dubbele Zoete Aagt, Dubbele Bellefleur, and the rootstock EM IX proved the most resistant; EM IV and EM VII also showed good resistance, and these 3 rootstocks are recommended for practical purposes. The very susceptible Cox's Orange should be grafted onto intermediate stocks of Dubbele Zoete Aagt or Dubbele Bellefleur, about 75 cm. above soil level.

**JONES (L. E.). Locus, time, and mode of action of western X-little Cherry virus in Sweet Cherry trees in Oregon. - Phytopathology, 49, 4, pp. 202-206, 13 fig., 1959.**

Anatomical studies at Oregon State College, Corvallis, on healthy sweet cherry trees and those infected by western X-little cherry caused by peach western X virus [36, p. 333] showed that symptoms were mainly confined to the fruits and seeds, within which changes were initiated during the flush of growth in the 5 weeks before harvest. The virus inhibited enlargement of the mesocarp cells and prevented the accumulation of oil in the developing embryos. The observed variation in symptom expression could be attributed to localized effects of the virus in each seed and fruit.

**BOLTON (A. T.). Cultural variation in Mycosphaerella fragariae. - Canad. J. Bot., 36, 6, pp. 935-940, 1 pl., 1 map, 1958.**

In studies at the Canada Dept Agric., Ottawa, and the University of Western Ontario, London, 25 cultural types of M. fragariae were recognized among isolates from several commercial strawberry vars. in Ontario, Quebec, Vermont, New York, and Michigan, each var. yielding a more or less distinct cultural type. Isolates from native Fragaria virginiana from different areas varied in colour, pigment production, rate of growth, topography of colony, and rate of conidial production. Isolates produced variants in culture on artificial media and exhibited differences in stability. Two cultural types produced variations or mutations after passing 5 times through hosts other than their original ones. It is postulated that the number of distinguishable types of M. fragariae occurring in nature is infinite, being limited only by the possible number of genetic variations in the host (J. Palchefskey & C. C. Allison: Abs. in Phytopathology, 40, p. 22, 1950).

**COOK (P. H.). Preventing Avocado root rot. - Calif. Citrogr., 44,**

pp. 215-216, 1959.

Hot water treatment of avocado seed against Phytophthora cinnamomi [cf. 37, p. 175] before planting is one of the requirements laid down by the State of California before nursery stock can be certified free from this fungus. Under a co-operative scheme in Ventura County, seeds in wire baskets (capacity 100-400 seeds according to size) are immersed for 30 min. in an insulated tank supplied with running water at 120-122°F., after which they are washed for 30 min. in cold water and then thoroughly dried in the sun.

**POBEGAJLO (I.). Mozaid Smokve u Hercegovini.** [Fig mosaic in Hercegovina.] - Rad. poljopriv.-šum. Fak. Univ. Sarajevu, 7, 9, pp. 3-23, 7 fig., 1958. [English summary.]

Reports from Hercegovina, Dalmatia, Montenegro, the Adriatic Coast, and Macedonia showed a progressive spread of fig mosaic virus [33, p. 734]. The disease has been reported also from Bulgaria, but not elsewhere in the Balkans. It is suggested that Homotoma ficus and Aceria ficus [34, p. 465] may be the vectors, the former being very widespread in Hercegovina, where studies for its control have been carried out. Quarantine measures are recommended.

**LOPRIENO (NICOLA) & TENERINI (I.). Metodo per la diagnosi precoce dell' 'occhio di pavone' dell' olivo (Cycloconium oleaginum Cast.).** [Method for the early diagnosis of 'olive leaf spot' (C. oleaginum).] - Phytopath. Z., 34, 4, pp. 385-392, 6 fig., 1959. [English and German summaries.]

This method, described from the Istituto di Ricerche Agrarie Società Montecatini, Signa, Italy, is to dip leaves infected by C. oleaginum [cf. 37, p. 671; 38, p. 124], before the appearance of macroscopic symptoms, in 5 per cent. NaOH, heated to 50 - 60°C. Dark spots appear in areas where the pathogen is present. It is also of assistance in determining the appropriate time to apply endotherapeutic fungicides.

**Plant Pathology.** - Rep. cent. Coconut Res. Sta. Kayangulam, 1956-7, pp. 16-27, [?1958].

Helminthosporium halodes [cf. 33, p. 294] and other fungi were isolated from diseased leaves collected in the Research Station garden and various other areas. In the laboratory infection by H. halodes occurred about 4 hr. after inoculation, the leaf tissues beginning to rot within 24 hr. In the field infection was established on all tender shoots inoculated. Progress of infection was most rapid, and its intensity greatest, under the humid conditions of June, July, and Aug. The fungus was able to enter through stomata as well as by mechanical penetration, and young conidiophores were detected on inoculated leaves within 48 hr. Isolates from areca nut infected coconut, and vice-versa. In the field 4 applications/yr. of (in order of effectiveness) Bordeaux mixture, perelan, cuprasana, Shell copper, and Kirti copper improved the condition of diseased palms. All had previously proved effective in the laboratory.

The saprophytic activity of Rhizoctonia [Corticium] solani and R. bataticola [Macrophomina phaseoli] was found to be directly correlated with the soil microflora [loc. cit.], which in turn was related to soil moisture.

The earliest symptoms of an unnamed virus infection [38, p. 23] were paling and wilting of young leaves, followed by flaccidity and yellowing of the leaflets, or sometimes premature nut fall. In inoculations by carborundum abrasion of 6 pairs of the middle leaflets of the youngest opened leaf, symptoms developed in 1

series only on 5 of 11 6-8-yr. old plants within 9-11 months. In transmission tests with the suspected vector *Stephanitis typicus* collected from diseased palms 5 of 12 palms, aged between 35 and 50 yr., developed symptoms 11 months after 1st inoculation: 1 of 6 controls also developed symptoms within 3 months; of 10 7-yr. old seedlings 2 showed symptoms within 10 months.

**CORBETT (M. K.). Diseases of the Coconut Palm. I. Lethal yellowing or unknown disease. II. Bronze leaf wilt. - Principes (J. Palm Soc.), 3, 1, pp. 5-12, 39, 6 fig.; 2, pp. 49-52, 2 fig., 1959.**

An account is given of the symptoms and control of a disease of coconut palms at Key West, Florida, not hitherto reported from the United States. It appears to be similar to or identical with the lethal yellowing found in Cuba and Jamaica [cf. 35, p. 366]. Bronze leaf wilt [cf. 36, p. 694; 37, p. 515], not so far recorded from the United States, is briefly described, with various views as to its etiology.

**WENZL (H.) & ZISLAVSKY (W.). Stichprobenpläne für die Testung von Kartoffelsaatgut. [Random sampling plans for the testing of seed Potatoes.] - PflSchBer., 21, 5-8, pp. 71-94, 1958. [Biol. Abstr., 33, 5, p. 1580, 1959.]**

A description is given of the 'double sampling lot inspection' technique used at the Bundesanstalt Pflanzenschutz, Vienna, for testing potato stocks for virus infection involving a small sample [25 or 50 tubers instead of 100-400) and incurring no greater risk of wrong classification. The efficiency of the tables provided is demonstrated by examples.

**ROSS (H.). Über die Verbreitung der Tabakrippenbräunestämme des Y-Virus der Kartoffel (Marmor upsilon Holmes var. costaeucans Klinkowski u. Schmelzer) in Deutschland und anderen Ländern. [On the distribution of tobacco veinal necrosis strain of Potato virus Y (M. upsilon var. costaeucans) in Germany and other countries.] - Phytopath. Z., 35, 1, pp. 97-102, 1959. [English summary.]**

Potatoes from a number of countries and from Germany infected by virus Y [37, p. 500] were tested for virus strains by inoculation of Samsun tobacco. In Germany in 1956-7 the proportion of the common strains to veinal necrosis strains [31, p. 201] was about 1:1. Thus both have participated in the high infection rate of virus Y in recent years.

**SOMMERAYNS (G.). Note relative à des réactions nécrotiques provoquées par le virus A de la Pomme de terre sur Nicotiana glutinosa L. [A note on the necrotic reactions produced by Potato virus A on N. glutinosa.] - Parasitica, 15, 1, pp. 29-34, 2 fig., 1959.**

When *N. glutinosa* plants were inoculated by the carborundum method at the Laboratoire de Phytovirologie, Gembloux, Belgium, using 3 strains of potato virus A, after 3 weeks (in general) round, necrotic spots appeared on the blade of the oldest leaves, wide necrotic areas later forming on the rest of the foliage. The reaction became systemic, and some inoculated plants wilted and died, but some developed only the early symptoms, the affected leaves falling off and the plant assuming a healthy appearance. The necrotic symptoms were identical at whatever time of the year the experiments were conducted, whatever strain of the virus was used, and whatever the source from which the seed of *N. glutinosa* plants was obtained.

NEWSAM (A.). Pathological Division. - Rep. Rubb. Res. Inst. Malaya, 1955, pp. 37-44, [1959].

In this report [cf. 38, p. 275] it is stated that in an experiment on an inland soil from which old rubber trees were removed and used for firewood, stump poisoning reduced root disease (*Fomes noxious*, *F. lignosus*, and *Ganoderma pseudoferreum*) in the young stand by 60 per cent. in the 1st 5 yr, during which time routine control methods were applied. On a coastal site where the old stand was felled and part left lying reduction in disease incidence from stump poisoning was only 30 per cent. in 4 yr. (possibly owing to spread of the disease by surface timber), though poisoning of standing trees reduced incidence by 80 per cent. Pink disease [*Corticium salmonicolor*; cf. 37, p. 677] has become more prevalent in recent years with the increase in the area of immature rubber.

GORDON (J.). The problem of ratoon stunting disease. - S. Afr. Sug. J., 43, 4, pp. 309, 311, 1959.

Useful information on diagnosis and heat treatment is presented in the form of a conversation between the author, a Zululand planter, and G. M. Thomson, pathologist at the Natal Sugar Experiment Station. The difficulties of diagnosis were demonstrated by a visit to 2 experimental plots, one on poor shale and the other on rich alluvial soil. On the former the symptoms of the virosis were clearly apparent in the shape of reddish-orange dots extending across the interior of the stalk in the susceptible var. N. Co. 334, whereas on the latter there were no obvious differences between the supposedly infected and the healthy canes, the effects of the disease being masked by the favourable growing conditions. The method of treatment employed locally consists in a 2 hr. immersion of the setts in water at 50°C., which is effective but tends to impair germination in some vars.

WAGENAAR (S.). Preliminary note on nucleic acid synthesis in Tobacco plants infected with Tobacco mosaic virus. - Tijdschr. Plziekt., 64, 5-6 (Van Slogteren Nummer), pp. 479-481, 1 graph, 1958. [Dutch summary.]

At the Laboratorium voor Bloembollenonderzoek, Lisse, Netherlands, the nucleic acid content of healthy and mosaic-infected leaves of White Burley tobacco harvested 30 days after infection, homogenized, and stored at 5°C., rose in the first hours of storage, more markedly so in the latter. After 65 hr. the content decreased but was still comparatively higher in the infected. From further experiments in which the homogenates were washed it seems likely that those from healthy plants contain a substance inhibiting the synthesis of nucleic acid.

RAPPAPORT (I.) & WILDMAN (S. G.). The distribution on *Nicotiana glutinosa* leaves of lesions produced by Tobacco mosaic virus. - Phytopathology, 49, 4, p. 231, 1 graph, 1959.

The attached leaves were inoculated uniformly at the Dept of Botany, University of California, Los Angeles, with a dilution series of tobacco mosaic virus in celite by means of brush, glass paddle, or index finger. On appearance of lesions the leaves were removed and fixed to the upper side of a sheet of carbon paper placed on graph paper and the lesions pricked through. The leaf was outlined and the total area arbitrarily divided into 25 sq. mm. squares, the no. lesions in each being recorded. Distribution was not random, the areas more difficult to infect, such as those near the petiole and leaf tip, needing a higher conc. of the virus than those more easily infected.

KÖHLER (E.). Weitere Beiträge zur Kenntnis der Virusausbreitung in der Tabakpflanze. [Further contributions to our knowledge of virus spread in the Tobacco plant.] - Phytopath. Z., 34, 4, pp. 393-397, 2 graphs, 1959. [English summary.]

From the Federal Biological Institute, Braunschweig-Gliesmarode, the author reports further experiments on the behaviour of potato viruses X and Y in var. Sam-sun [38, p. 134]. The lag period and multiplication time of virus X were identical when the viruses were inoculated directly in old and young leaves. When mixed saps containing the viruses were inoculated to old leaves, Y required only a short time to reach the top leaves, whether applied in parts of 1 or 50 per cent. This is in line with the hypothesis previously put forward that X virus is retarded by a specific inactivating factor in the phloem which has no effect on virus Y and other viruses such as the common tobacco and cucumber mosaics. The phenomenon can be explained in terms of 'mature resistance', though the cause differs from that of mature resistance in the potato [38, p. 25].

REKSODIMOELJO (R. S.). Penjakit-penjakit tembakau Virginia Tanaman rakjat didaerah Klaten. [Diseases of Virginia Tobacco in small-holdings in the Klaten region.] - Tehn. Pertan., 6, 1, pp. 20-35, 1957. [23 ref. English summary.]

Most of the tobacco area in the Klaten regency, Java, is planted with Harrison Special, susceptible to Phytophthora [parasitica var.] nicotianae [30, p. 263]; Oxford 402 is more resistant, but is of poorer quality and less widely grown. Pythium debaryanum [map 208] is uncommon in the district. Cercospora nicotianae, very common on old leaves, and Alternaria tabacina may be controlled by spraying, improved cultivation, and correct flue-curing. Reference is also made to the occurrence of Xanthomonas [Pseudomonas] solanacearum and of virus diseases.

BOYLE (J. S.). The role of Tobacco mosaic virus in the internal browning disorder of Tomato. - Abs. in Phytopathology, 49, 4, p. 227, 1959.

In replicated 10-plant plots [at Pennsylvania State University] 40 plants each of Rutgers tomato were inoculated with 17 isolates of tobacco mosaic virus (TMV) and single isolates of tobacco ring spot virus, cucumber mosaic virus, and an unidentified virus from Mertensia virginica. When fruit was harvested 21 days later internal browning [38, p. 102] was greatest in the TMV plots, with a max. of 97.5 per cent. plants and 20.94 per cent. affected fruit in 1 treatment. Incidence in the uninoculated plots was 17.5 per cent. plants (0.36 per cent. fruit), 28.95 (3.91), and 0; in plots inoculated with the other viruses it was similar to that in the controls.

PAPASOLOMONTOS (A.) & WILKINSON (R. E.). The effect of nitrogen, phosphorus and potassium levels on growth and virus content of excised Tobacco-mosaic-virus-infected Tomato roots. - Abs. in Phytopathology, 49, 4, p. 229, 1959.

When excised roots of tomato plants, either healthy or infected with tobacco mosaic virus, were grown in White's culture solution the diseased roots were shorter and formed fewer laterals unless the level of N and P was raised so that it stunted the healthy roots; then the diseased roots were as long as or longer than the healthy. No differences in K requirement were apparent. Virus conc., assayed on Nicotiana glutinosa, increased as the N and P levels in the culture solution were raised from sub-normal to above-normal; K increases had no significant effect. The results support the theory that the systems producing both normal plant protein and virus protein compete for the available N and P.

GÄUMANN (E.) & NAEF-ROTH (S[TEPHI]). Über Lycomarasminsäure, ein Umwandlungsprodukt des Lycomarasmins. [On lycomarasminic acid, a transformation product of lycomarasmin.] - Phytopath. Z., 34, 4, pp. 426-431, 2 graphs, 1959. [English summary.]

From the Institut für spezielle Botanik, Zürich, it is reported that the acid form of lycomarasmin induces the same injury symptoms qualitatively as lycomarasmin [cf. 36, p. 792; 38, p. 102], being 3 times more active, probably as a result of stronger chelating capacity. The action of the acid on young tomato shoots is probably similar to that of lycomarasmin, since its toxicity is also increased by Fe ions and decreased by Cu ions. In spite of the higher initial toxicity of lycomarasminic acid, chelation of the ions does not produce a higher toxicity than the lycomarasmin-Fe complex.

SPURR (A. R.). Anatomical aspects of blossom-end rot in the Tomato with special reference to calcium nutrition. - Hilgardia, 28, 12, pp. 269-295, 3 col.pl., 3 fig., 2 graphs, 1959. [83 ref.]

This report from the Experiment Station, Davis, California, on the general symptoms of blossom-end rot of tomato [37, pp. 378, 702] describes in detail the anatomical aspects of the disorder. The inception of the rot was observed in field-grown San Marzano tomatoes in relation to age and development of the fruit. Incipient stages of the rot occurred about 10-15 days after anthesis, when the fruit was 38-60 per cent. full grown in length (when longitudinal growth increments are very large in proportion to the size of the fruit); in affected fruits this longitudinal growth is retarded. Both externally visible and deep-seated symptoms may occur separately or together at the distal end as a result of a progressive necrosis of groups of cells with subsequent partial dehydration of the affected area. This highest incidence of rot observed involved over 55 per cent. of the fruits.

Cytologically, the 1st indication of externally visible lesions is the development of brown proteinaceous inclusions in the epidermal and deeper seated cells of the pericarp. These necrotic cells may collapse and a wound healing response is usually evoked in the adjacent living tissue. Light-yellow to brown proteinaceous inclusions also occur in the cells of the deep-seated lesions, particularly in parenchyma cells associated with the vascular bundles of the placental axis. Degradation products in some cells give a typical wound gum staining reaction and positive tests for proteins. The cells of affected fruits are often glutted with starch grains.

Affected cells appear to become dehydrated to some extent after necrosis, but no conclusive histological evidence was found to support the view that the disorder is primarily due to water stress. Analysis showed that the fruit has a low Ca content, particularly the distal end, where the rot is located, and together with the histological and cytological observations confirmed the conclusion of other workers that blossom-end rot in tomatoes is mainly due to Ca deficiency.

POMMER (E. H.). Über die Isolierung des Endophyten aus den Wurzelknöllchen *Alnus glutinosa* Gaertn. und über erfolgreiche Re-infektionsversuche. [On the isolation of the endophyte from root nodules of *A. glutinosa* and successful reinfection experiments.] - Ber. dtsch. bot. Ges., 72, 3, pp. 138-150, 4 fig., 1959.

At the Botanischen Institut der Technischen Hochschule, Aachen, Germany, a fungus, described in some detail and thought to be probably an actinomycete, though not identical with *Actinomyces alni* [38, p. 428], was isolated from root nodules of *Alnus glutinosa* (H. Taubert. Planta, 48, pp. 135-136, 1956) on glucose-asparagine agar. Nodule formation was induced in seedlings grown under sterile conditions on silica gel by exposure to aqueous suspensions of the organism.

BECKMAN (C. H.). Dutch Elm disease control with polychloro-benzoic acid. - Abs. in Phytopathology, 49, 4, p. 227, 1959.

Treatment of 25 young elm trees (12-18 ft.) by painting a 2 in. band of 2, 3, 5, 6-tetrachlorobenzoic acid (65 per cent. in oil, Amchem Prod. Co.), with or without the chloride of Ca, Mg, Mn, or Fe, round the base of the trunk at bud break (9 May) and of 25 trees at full leaf (22 May) was followed by inoculation with Ceratocystis ulmi [37, p. 602] on 23 June and again on 18 July. On 13 Sept. infection averaged 95 per cent. in the untreated and 16 and 52 per cent. in the 2 treatments, respectively; application at bud break without chloride reduced infection to nil, injury being 8 per cent. foliar necrosis.

HUSAIN (A.) & DIMOND (A. E.). The function of extracellular enzymes of Dutch Elm disease pathogen. - Proc. nat. Acad. Sci. Wash., 44, 6, pp. 594-601, 1958. [Biol. Abstr., 33, 5, p. 1575, 1959.]

The production of polygalacturonase and cellulase by Ceratocystis ulmi [37, p. 740] when grown on chopped elm twigs was detected at Connecticut Agricultural Experimental Station, New Haven. The cellulase was not able to attack native cellulose, but hydrolysed carboxymethyl cellulose to glucose. Maximum activity of both was at pH 5.5; neither is involved in pathogenesis in the elm.

GRISWOLD (C. L.). Transmission of the Oak wilt fungus by certain woodland-inhabiting Drosophilidae. - J. econ. Ent., 51, 5, pp. 733-735, 1958. [Biol. Abstr., 33, 5, p. 1575, 1959.]

Successful transmission tests at Ohio Agricultural Experimental Station, Wooster, with the flies Drosophila putrida, D. funebris, D. tripunctata, D. busckii, and Parascaptomyza disticha indicates that they must be considered as potential vectors [cf. 37, p. 603] of Ceratocystis fagacearum [37, p. 741]. The flies were fed upon fresh sporulating mat cultures and transferred to fresh xylem wounds in healthy oaks.

SCHOENEWEISS (D. F.). The use of systemic chemicals in Oak wilt chemotherapy and their effect upon disease development. - Diss. Abstr., 19, 4, p. 653, 1958.

Of 14 chemicals evaluated as therapeutics at Ohio State University, and known to possess systemic properties, vancide 51, injected into the bole of oaks, was the only one which significantly delayed the appearance of oak wilt (Endoconidiophora [Ceratocystis] fagacearum) [cf. 37, p. 742]. The effectiveness of systemics against the disease in the field was not related to fungitoxicity in culture. Vancide 51, dithane Z-78, and zerlate were not toxic when added to oak sap, nor were the 1st 2 to potato dextrose broth cultures of the pathogen; zerlate was partially inactivated in potato dextrose broth; the toxicity of manzate remained unchanged. Since vancide 51 contains a dithiocarbamate, and dithane and zerlate are dithiocarbamates, the 2-mercaptopbenzothiazole moiety of vancide 51 is probably the ingredient active against oak wilt.

It was found that tylose formation is most rapid and extensive in black oaks. The percentage of vessels with tyloses at symptom appearance (35 days after inoculation) was greater than in white oaks 70 days after inoculation, when no symptoms were apparent. White oaks are not as susceptible as black to whatever incites tylose formation. The formation of bands of open vessels, formed external to bands of plugged vessels during the growing season in which symptoms appeared, may be a type of morphological resistance in white oaks. An annual ring of open vessels was formed external to the ring of plugged vessels in a pin oak bole injected with vancide 51. The tree remained alive for at least  $1\frac{1}{2}$  yr. and wilt symptoms were

similar to those of white oak in which morphological resistance was found. The bole injection method as modified by the author was superior in effectiveness to foliar sprays and soil drenches.

BLOOMBERG (W. J.). Some anatomical evidence for resistance of *Populus* spp. to Cytospora canker disease. - Abs. in C.P.S. News, 11, 2, p. 1, 1959.

Comparison of the anatomical stem characteristics of 3 *Populus* spp. at the Dept. of Biology and Botany, University of British Columbia, showed that *P. robusta*, most resistant to *C.* sp. [cf. 38, p. 397], had features suggesting greater water storage, translocation, and retention, i.e. a larger pith, more vessels, longer phloem rays, wider sieve-tube zone, more sclerenchyma cells, and wider periderm than the least resistant, *P. trichocarpa*. *P. regenerata*, was intermediate in resistance and in many of the anatomical features. Bark characteristics of *P. robusta* also suggest greater resistance to penetration and spread of the fungus than those of *P. trichocarpa*.

HUBBES (M.). Untersuchungen über *Dothichiza populea* Sacc. et Briard, den Erreger des Rindenbrandes der Pappel. [Studies on *D. populea*, the agent of bark canker of Poplar.] - Phytopath. Z., 35, 1, pp. 58-96, 11 fig., 6 graphs, 1959. [English summary. 83 ref.]

At the Institut für Pflanzenkrankheiten, University of Bonn, Germany, it was found that on synthetic nutrient media with different C sources *D. populea* [38, p. 103] could utilize only maltose and to a limited extent starch, the breakdown occurring evidently through phosphorylated sugars. If the starch is broken down by diastase the fungus can then utilize glucose. With amino-acids in the synthetic nutrient solution growth is invariably less than on a biomalt nutrient solution. The same result was observed when various other active substances were employed. The fungus thrives best on an extract of poplar bark.

Nine cultures of *D. populea* of different origin showed clear differences in their temp. reactions, brown coloration of poplar bark extract, and pathogenicity for test cuttings of poplar. The deepest coloration corresponded to the greatest pathogenicity. Mycelial infections are successful at 3-30°, 3-20°, and 3-10° and at constant temp. under 12°. Defence reactions prevent infection above 16°. The opt. for early spore germination is 16-20° and the opt. pH is 5.2. Unwounded 1-yr.-old plants, grown at 16° and placed at 3° for 14 days before inoculation with a spore suspension, were successfully infected, but a repetition on greenhouse plants and on vigorous 1-yr.-old plants in the open was negative [cf. 38, p. 341]. Weak greenhouse plants, from which the leaves had been removed shortly before inoculation, were infected through the lenticels and only slightly through the wound scars. Repetition with 5-month-old greenhouse plants gave negative results.

A wilt toxin was isolated from the culture filtrate of *D. populea* and by hydrolysis of the toxin glucose was produced and demonstrated by paper chromatography. In the fresh state an inhibitory substance was isolated.

Forest Pathology. - Rep. For. Res. Inst. N. Z., 1958, pp. 22-26, 1959.

Serious concern has been caused by the heavy mortality of natural regeneration in the lower site classes of *Pinus radiata* [cf. 35, p. 565; 38, p. 121] in Kaingaroa Forest caused mainly by frost followed by *Diplodia pinea* [cf. 38, p. 40]. Root and stem canker disease of conifers (?*Peniophora saccata*) was at first thought to be confined to N. Auckland forests, but over the last 6 yr. it has been found in all conservancies except Canterbury. In 1957-8 it was recorded on *Pinus radiata* in young natural regeneration at Maramarua Forest, on 2-yr.-old trees at Te Wera Forest, and in a privately owned young shelter belt near Palmerston South.

During the spring, Botrytis cinerea again became troublesome in Granville Forest, causing the loss of several thousand P. radiata in seedling beds, in bundles ready for planting, and in newly planted stock in heavy bracken-fern country. Established Eucalyptus gigantea was also heavily attacked.

Rhizoctonia [Corticium] solani was the cause of damping-off in nurseries at Whakarewarewa and Rotoehu, the 1st record from Forest Service nurseries. A Pythium sp. also caused damping-off at Whakarewarewa, and was also responsible for a severe root rot of older nursery stock. Chloropicrin treatment of the soil accelerated seedling growth but fertilizers and forest 'duff' had no effect on mortality. In the unsterilized beds post-emergence mortality averaged 40 per cent., while in the sterilized beds it was reduced to about 15 per cent. Tree spp. varied in their susceptibility, mortality ranging from 10 per cent. in Douglas fir (Pseudotsuga [menziesii]) to 58 per cent. in Corsican pine (Pinus nigra var. calabrica).

GREMMEN (J.). Über zwei Phaciaceae von Pinus sylvestris L. [On two Phaciaceae on P. sylvestris.] - Phytopath. Z., 35, 1, pp. 27-30, 1 fig., 1959. [English summary.]

From the Forstlichen Versuchsanstalt 'De Dorschkamp', Wageningen, Netherlands, it is reported that apothecia of Phaciella coniferarum [36, p. 625], sometimes accompanied by the imperfect state (Phomopsis pseudotsugae), were collected in late autumn on thick, fallen branches broken off by heavy snow in the winter of 1957-8. This is the 1st report of apothecia in Europe. Apothecia of Phacidium lacerum were found in early spring on dead fallen needles of Scots pine.

Both fungi have been cultured from ascospores and pycnidiospores. Brown mycelia and mature pycnidia developed. P. lacerum grows faster than Phaciella coniferarum and produces a pycnidial state identical with Ceuthospora (Dothiorella) pinastri.

ITO (K.), SIBUKAWA (K.), & KOBABAYASHI (T.). Blight of Sequoia gigantea seedlings caused by Cercospora cryptomeriae. - J. Jap. For. Soc., 40, 9, pp. 407-410, 1958. [Japanese with English summary. Biol. Abstr., 33, 5, p. 1575, 1959.]

C. cryptomeriae, found in Japan in 1950 [34, p. 415; 36, p. 219] severely attacking needles and twigs of S. gigantea and causing death, was isolated and studied in culture.

REINHARDT (C. J.). Tödliche Raucheinwirkungen durch neu errichtete Industrieanlagen. Praktische Hinweise für den Waldbesitzer und Forstmann beim Neuaftreten von Rauchschäden. [Lethal smoke effects from newly erected industrial plants. Practical hints for the forest-owner and forester on the new appearance of smoke damage.] - Forst-u. Holz., 14, 10, pp. 229-230, 1 fig., 1959.

Attention is drawn to a case of lack of precautions against smoke damage in the Münster district of W. Germany [cf. 37, p. 21], where fumes from a brick kiln which began working about 3 yr. ago have killed an adjacent stand of 20-25-yr.-old spruces [cf. below] covering an area of some 10 morgen [1 morgen = 0.631 acre]. Even the 80 m. -high chimney added subsequently to supplement the existing short ones does not confer absolute protection against the noxious gases, the gradually lessening effects of which are known to extend for a distance of 10 times the height of the chimney, thereby imperilling the extensive conifer forests situated 800-1,000 m. away from the works. Some general guidance on the legal aspects of, and methods of approach to, the problem is given [cf. 38, p. 283].

MATERNA (J.). Kieselsäure gehalt in rauchgeschädigten Fichtennadeln. [Silicic acid content of smoke-damaged Spruce needles.] - Naturwissenschaften, 46, 8, pp. 270-271, 1959.

Two analyses were made at the Institut für Forstwirtschaft der ČASZV, Zbraslav II, Czechoslovakia, of the mineral content of smoke-damaged spruce needles [cf. above] from a chronically affected area in the Erzgebirge, one collection of 1- and 2-yr.-old needles being made in the winter and another in the spring. The SiO<sub>2</sub> content of the damaged material was uniformly higher than that of the healthy.

OGAWA (J. M.), WILSON (E. E.), & ENGLISH (H.). The leaf blight disease of Almond and its control. - Hilgardia, 28, 10, pp. 239-254, 3 fig., 2 graphs, 1959.

A previously undescribed disease of almond reported from California and named 'leaf blight', was first found in an orchard in Butte County in 1950 and has since appeared throughout the Sacramento Valley and the northern part of the San Joaquin Valley. The disease is characterized by sudden withering and dying of the leaves in summer, the affected leaves remaining on the twig, where remnants of the petioles can be found the following spring. The causal organism resembles Hendersonia rubi [cf. 12, p. 705], both as regards variability in conidial fructifications, and the size, shape, and colour of the conidia, and is identified as such. It only becomes visible in the late autumn or early winter, when small black pycnidia and acervuli develop over the base of the petiole. The opt. growing temp. is 24-30°C. which is also most favourable for the production and germination of the conidia. It survives in remnants of blighted petioles on the tree, where it produces abundant conidia in winter, which appear to be responsible for new leaf infections during the following summer. On highly susceptible almond vars. (Drake, Ne Plus Ultra, and Peerless) 15-20 per cent. of the leaves may be destroyed during the growing season, and an immediate reduction in productivity results from the loss of leaf and flower buds killed by the fungus extending from the base of the leaf petiole into the supporting twig.

Spraying experiments show that control can be obtained either by the application of protective fungicides to the leaves in spring or of eradicator sprays in late winter. Fungicides containing captan, dichlone, or ziram applied at petal fall or shortly after gave adequate protection to the leaves, while those containing zineb and maneb were less effective. Proprietary formulations of Na pentachlorophenoxyde (8 lb./100 gal.) and N-phenylmercuriethylenediamine (2·5 lb.) applied to the dormant trees in late winter destroyed a large amount of the conidial inoculum and resulted in considerably less new infection in the following summer.

GROHN (H.) & DETERS (W.). Über den Abbau von Fichtenholz durch Lenzites saepiaria. [On the degradation of Spruce wood by Lenzites saepiaria.] - Holzforschung, 13, 1, pp. 8-12, 2 graphs, 1959. [English summary. 26 ref.]

At the Organisch-Chemisches Institut der Pädagogischen Hochschule, Potsdam, following up the work of Schubert and Nord [30, p. 254] and of Apenitis et al. [31, p. 414], the authors made an experimental study of the action of L. saepiaria on spruce sawdust. The methoxyl content of both alcohol-extracted and Klason lignins was found to decrease practically linearly with the degree of disintegration, the slope of the curve being reproducible. The alteration in the lignin expressed by the decline of the methoxyl content is attributed primarily to enzymatic activity. Ether-soluble lignin residues were shown to occur in the infected wood.

KOHLMAYER (J.). Beobachtungen über mediterrane Meeres-

pilze sowie das Vorkommen von marinen Moderfäule- Erregern in Aquariumszuchten holzzerstörender Meerestiere.  
 [Observations on Mediterranean marine fungi and the occurrence of marine rotting agents in aquarium-bred wood-destroying marine animals.] - Ber. dtsch. bot. Ges., 71, 2, pp. 98-116, 8 fig., 1958.

From the Bundesanstalt für Materialprüfung, Berlin-Dahlem, 3 wood-inhabiting marine fungi [38, p. 42] are reported as new occurrences for the Mediterranean. *Ceriosporopsis halima* [34, p. 197] occurred on willow from the sea, Chioggia, Lagoon of Venice, Italy. The wood had been immersed for a long time and when retrieved was colonized by *Teredo pedicellata*, *Limnoria tripunctata*, and *Chelura terebrans*, in whose tracks were found individual conidia of a new sp., *Helicoma macrocephala* Kohlmeyer. The wood was weakened to a depth of 1-2 mm. and stained brown. On the boundary between this region and the sound wood the secondary walls were penetrated, as is typical for rotting fungi. Fruit bodies were situated 35-100  $\mu$  below the surface, formed mainly within the tracheae and completely occupying their lumina. The form of the peritheciun is, therefore, dependent on the diam. of the vessels, which determines their regular cylindrical form. The fruit bodies were situated in the outwardly unchanged tracheae and only the secondary walls of the cells were attacked in the immediate vicinity. A number of normal bullet-shaped perithecia also appeared at one place on the outer layer of wood. A fair-sized sample of the wood, suspended in a ventilated aquarium with artificial sea water at Berlin-Dahlem, became strongly perforated by borers in  $4\frac{1}{2}$  months, and no traces of the originally numerous perithecia were to be found.

*Lulworthia* spp. occurred on beech wood in the sea at Chioggia, immersed for 15 months. It was infested by *T. pedicellata* and *Bankia minima* and was stained greyish black, being externally heavily softened by fungus cellulose decomposition. The black *Lulworthia* perithecia were embedded in the soft layer, with necks eccentrically placed on the fruit bodies and protruding from the substratum.

*H. macrocephala*, a typical representative of marine rotting fungi, attacks and weakens wood immersed in sea water very severely. The conidia are formed individually, mostly on the surface of the wood, or infrequently in the cell lumina. The type material (pine and beech) was derived from Venice, where it had been suspended for 15 months in the lagoon and had been infested by *T. pedicellata* and *B. minima*. A second specimen of *H. macrocephala* was found on *Pseudotsuga menziesii* wood taken from the sea at Plymouth, England.

CANOVA (A.). Ricerche su la biologia e l'epidemiologia della *Cercospora beticola* Sacc. Parte I. Parte II. [Researches on the biology and epidemiology of *C. beticola*. Part I. Part II.] - Ann. Sper. agr., N.S., 13, 1, pp. 37-82, 6 pl., 3 graphs; 2, pp. 157-203, 13 graphs, 1959.  
 [English summaries, pp. 79-82; 201-203.]

From a 5-yr. study at the Laboratorio Sperimentale di Patologia Vegetale, Bologna, on beet leaf spot (*C. beticola*) [cf. 37, pp. 386, 430 et passim] the author, basing taxonomic observations on the characteristics of the fungus in culture and on its natural hosts, does not agree with suggestions of its synonymy with *C. apii* and *C. nicotianae* [cf. 35, p. 737]. Natural infection by *C. beticola* was noted in various places in Emilia and Veneto on *Amaranthus albus*, *A. deflexus*, *Verbena officinalis*, and *Chenopodium* sp.

The fungus grew readily in culture at 15-30°C., (opt. approx. 28°, max. over 35°, min. a little under 5°). The mycelium, however, resisted 40° and -35° for several days without loss of viability. Light intensity had no effect on mycelial growth. The water content of the medium proved to be of fundamental importance, growth rate falling as it decreased. Nitrate N appeared to be the only source of N favouring growth; glucose and saccharose were utilized almost equally, and levulose, maltose, starch, and dextrin (but not glycerin) were good sources of C. Growth ceased almost completely at about pH 3 and over 8, but reached an opt. in a slightly

acid medium.

The monoconidial strains obtained from various localities differed frequently in appearance, growth rate, and conidial production, and similar difference sometimes arose from conidia from the same leaf spot. The most significant variations were in the production of conidia in culture. Some strains remained completely sterile, others constantly formed abundant conidia. The nuclei of a conidium all derive from one nucleus. After considering various hypotheses to account for these variations in culture, the author concludes that they may be due to a character transmitted via the cytoplasm.

The 2nd paper notes that germination began before the conidia had fully developed, but reached its max. in material which had completed its differentiation. It was quicker, with the formation of more numerous and longer germ-tubes, in conidia on the natural host than in culture. Both on the host and in culture conidial formation was markedly lower at 5° and 35° than at the opt. (30°). Germination at 25° was most rapid in conidia previously kept at about -10° for 24 hr. It was slower after keeping at -35°, even more so after 40°, and did not occur after 70°; no loss of viability was noted in conidia exposed to -35°. Conidial formation was arrested at a few degrees above 0° and above 40°; at temps. under 15° the formation of germ-tubes from the intermediate cells of the conidium ceased. Germination was better in a saturated atmosphere than in tap water and was arrested on glass surfaces at R. H. < 90 per cent., and at slightly lower hygrometric levels on green beet leaves; it was greater, in the same thermo-hygrometric conditions, on green leaves than on glass, and was impeded by direct sunlight.

Near 0° resting conidia *in vivo* lost germinability between the 9th and the 10th month, and in the 8th month at about 20°, though *in vitro* they lost viability at 20° in about 3 months. Germ-tubes and germinating conidia were killed at 50°. The resistance of the conidiophores to temp. conditions was the same as that of resting conidia.

**NATTI (J. J.). Systemic infection of Bean by Tobacco necrosis virus in New York.** - Abs. in *Phytopathology*, 49, 4, p. 228, 1959.

Tobacco necrosis virus found to be causing a natural systemic infection of *Phaseolus vulgaris* in the field and greenhouse at Geneva, New York, was considered probably identical with the bean stipple streak [38, p. 449] of Holland. All vars. of *P. vulgaris* and 1 of soybean became systemically infected after inoculation; on *P. lunatus* local lesions occurred, but no systemic infection. *P. coccineus*, *Lotus corniculatus*, lucerne, *Melilotus alba*, pea, and clover were symptomless and no virus was recovered. Numerous other spp. developed local necrotic lesions. In virus infested soil 13 per cent. of *P. vulgaris* (California red kidney) sown and 52 per cent. transplanted as seedlings developed systemic infection.

**JACKSON (C. R.). Alternaria leafspot disease of Cucurbits.** - Diss. Abstr., 19, 5, p. 940, 1958.

The host range of *Alternaria cucumerina* [31, p. 417] studied at the University of Florida included watermelon, muskmelon, cucumber, 3 squash spp., bur gherkin and several native plants. The opt. range for germination of conidia was 20-28° C. Mycelial growth of 3 isolates in a liquid medium was significantly greatest at 24-28° and with an initial pH of 5. The viability of conidia stored *in vitro* at constant temps. of 8°, 28°, and 32° was over 90 per cent. after 255 days' storage. Protected and exposed conidia rapidly became non-viable when placed in soil, but dormant mycelium in recovered leaf fragments resumed growth under favourable conditions and produced conidia which served as inoculum for new infections. The host leaf epidermis was penetrated directly by germination hyphae of the fungus.

**VAN KOOT (Y.) & VAN DORST (H. J. M.). Die invloed van enkele virussen op de bloemvorming bij Komkommer.** [The influence of some viruses on flower formation in Cucumber.] - Tijdschr. PlZiekt., 64, 5-6 (Van Slogteren Nummer), pp. 432-439, 1 graph, 1958. [English summary.]

In experiments at the Proefstation voor de Groenten- en Fruitteelt onder glas, Naaldwijk, infection of cucumber plants with Cucumis virus 1 [cucumber mosaic virus] was found to double the number of male flowers and halve that of female ones. Cucumis viruses 2 and 2A [cucumber green mottle mosaic and a strain thereof], however, caused the formation of more female flowers, fewer male, and more and longer tendrils. It is suggested that these viruses may act by influencing auxin levels in the host.

**SEMAL (J.).** Sur quelques isolements du virus de la mosaïque du Concombre. [On some isolates of the Cucumber mosaic virus.] - Bull. Inst. agron. Gembloux, 26, 1-3, pp. 194-202, 1 pl., 1958. [English summary.]

At the Laboratoire de Pathologie Végétale, Gembloux, cucumber mosaic virus isolates from naturally infected chicory [cf. 36, p. 300], Brassica sp., and tobacco were transmitted to chicory in the greenhouse by sap-inoculation. The infected chicory plants developed a yellow mosaic pattern on the leaves, and some had yellow dots with a green or necrotic centre. Naturally infected chicory in the field had concentric ring-spots on the old leaves and a yellow mosaic pattern on the young.

The inactivation temp. of the isolate from tobacco in leaf extracts from various plants was lower in sap from chicory than from tobacco or Nicotiana glutinosa. The isolate from Brassica sp. displayed normal virulence when inoculated into several non-cruciferous hosts.

**SEMAL (J.).** Une variante du virus de la mosaïque du Concombre isolée de Colza. [A variant of the Cucumber mosaic virus isolated from Rape.] - Bull. Inst. agron. Gembloux, 26, 1-3, pp. 203-207, 1958. [English summary.]

A strain of cucumber mosaic virus [see above] isolated from symptomless, naturally infected, cultivated rape (Brassica napus var. oleifera) gave a symptomless, systemic infection in rape and produced mild symptoms in vegetable marrow. A strain of the same virus from chicory gave rise to marked symptoms in vegetable marrow, but did not produce systemic infection in rape.

**DIENER (T.O.) & WEAVER (MERLE L.).** Reversible and irreversible inhibition of necrotic ringspot virus in Cucumbers by pancreatic ribonuclease. - Virology, 7, 4, pp. 419-427, 1 graph, 1959.

At the State College of Washington, Prosser, the addition of pancreatic ribonuclease to extracts from cucumber leaves inoculated with [cherry] necrotic ring spot virus [cf. 28, p. 223; 35, p. 688] obtained from Prunus mahaleb inhibited the infection of cucumber cotyledons. Infectivity was restored by diluting the inoculum and (to some extent) by storing the inoculum-enzyme mixtures 30 min. - 1 hr. at 10°C. This type of inhibition was probably due to some effect produced by the enzyme upon the susceptibility of the host.

Storage of the inoculum-enzyme mixtures 12-24 hr. at 10° induced a renewal of the gradual loss of infectivity, which was only partially reversible by dilution. After 48 hr. storage infectivity was lost completely and could not be recovered by dilution. It was concluded that this irreversible type of inhibition was caused by a progressive enzymatic action upon the virus nucleic acid.

**HAWKER (LILIAN E.).** The development of the fruit-body of Diehlomyces microsporus (Diehl and Lambert) Gilkey (Syn. Pseudobalsamia microspora Diehl and Lambert). - Trans. bot. Soc. Edinb., 38 (Issue in honour of Prof. Matthews 70th birthday), pp. 71-75, 1 pl., 1 fig., 1959.

A study at the University of Bristol of the structure and development of *D. microsporus* [cf. 35, p. 71] from mushroom beds showed that the apparent folding of the ascogenous mass is due to splitting through tension set up by unequal growth, no true folding occurring. This observation supports the transfer of this fungus from the Tuberales to the Eurotiales.

**PIERI (G.).** Ulteriori indagini sulla diagnosi della 'degenerazione infettiva' della Vite con mezzi colorimetrici. [Further investigations on the diagnosis of 'infectious degeneration' of the Vine by colorimetric methods.] - *Ann. Sper. agr.*, N.S., 13, 2, pp. 307-311, 1959. [English summary.]

In further tests at the Stazione Sperimentale di Viticoltura e di Encologia, Conegliano, in 1956-7 with the method of Lindner et al. [cf. 35, p. 865; 36, p. 409], the variability of coloration obtained with both healthy and degenerated vines was such that the results were considered to be negative.

**FERRI (F.).** Contributo alla conoscenza della biologia della Plasmopara viticola (Berk. et Curt.) Berl. et De Toni. [A contribution to the knowledge of the biology of *P. viticola*.] - *Ann. Sper. agr.*, N.S., 13, 2, pp. 249-256, 6 pl., 1959. [English summary.]

At the Istituto di Patologia Vegetale, Università di Bologna, leaves of 1-yr.-old potted Malvasia vines, either detached or attached to the plant and kept at 15°, 20°, and 25°C., and 100 per cent. R.H., were inoculated with an aqueous suspension of the zoosporangia of *P. viticola* and observations of the mycelium within leaves of different ages made 2½, 5, and 10 hr. after inoculation and at 8 a.m. each day during the incubation period. The growth of the mycelium and the incubation period were unaffected by the age of the leaf and by its attachment or non-attachment to the plant.

**Outbreaks and new records.** - *F.A.O. Pl. Prot. Bull.*, 7, 4, pp. 54-55, 1959.

Reporting from the Italian Cryptogamic Laboratory, University of Pavia, R. CIFERRI states that stripe disease (*Cephalosporium gramineum*) [cf. 37, p. 275] was discovered near Pavia, Italy, in April 1957 during a survey of grass diseases in a mixed artificial pasture with meadow foxtail (*Alopecurus pratensis*) as the dominant sp. and apparently the only one affected. The author considers that the fungus is only a specialized form of *C. acremonium*, which is very variable in morphology, cultural characters, and parasitism.

T. N. KAUL, Agriculture Research Laboratories, Lalmandi, Srinagar, states that during Aug. 1958 rice in Jammu Province, Kashmir, was affected by *Xanthomonas oryzae* [map 304]. Stripe rust (*Puccinia glumarum*) [map 97] was rather prevalent on wheat and barley in Sept. 1958 in the Ladakh district, where it had not previously been found.



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